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NATURAL SCHOOL GEOGRAPHY

REDWAY AND HINMAN

PART ONE

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AMERICAN BOOK COMPANY
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THE NATURAL GEOGRAPHIES

NATURAL SCHOOL GEOGRAPHY

PART ONE

BY

JACQUES W. REDWAY

AND

RUSSELL HINMAN

Author of the "Eclectic Physical Geography"

NEW YORK ·:· CINCINNATI ·:· CHICAGO

AMERICAN BOOK COMPANY

NATURAL SCHOOL GEOG.
W. P. 3

PREFACE

The Natural School Geography is intended to follow a first or introductory text-book in the subject, and is adapted for the use of pupils of from twelve to fourteen years of age. It is designed to complete the course of geography in the elementary schools.

The central thought in the book is Man, and the Earth is studied as his dwelling place. Throughout the treatment emphasis is placed upon industrial, commercial, and political geography.

But man's activities are all influenced, and often very largely controlled, by his physical surroundings — climate, surface, soil, etc. The marked industrial differences between New England and our Gulf States are due in great measure to differences in physical features; and the same is true in varying degree of any two regions on the earth's surface.

It is thus manifest that an intelligent study of the activities of man in their causal relations must be based upon some knowledge of physical geography. For this reason, the first thirty-five pages of this book are devoted to the development, in simple, untechnical language, of the basal principles of physical and general geography. These principles are of world-wide application, and constant reference is made to them in subsequent pages. To facilitate such references, the paragraphs in this part of the book are numbered. These lessons should be carefully read and discussed by pupils and teachers, in class, before assignment for study, and before the study of the grand divisions is begun. Formal recitations on the introductory lessons may be deferred, however, at the discretion of the teacher, until the book is finished and reviewed.

The Topics for Oral and Written Work and the exercises in Correlations and Comparisons which have been inserted at convenient intervals in this book not only serve as reviews, but are so framed that they stimulate thought and lead the pupil to view what he has learned from a somewhat different standpoint. They form a nucleus for the "laboratory work" now recognized as an essential feature in the study of geography.

In recognition of the fact that well-selected geographical reading used in connection with the regular text-book greatly enriches the geography course, specific references to appropriate, entertaining, and easily accessible collateral material have been inserted at the ends of sections throughout the book, under the heading Supplemental Work. This should be used to the extent which time and circumstances permit.

Corresponding maps throughout the book are drawn on the same scale, and therefore prevent the pupil from forming the usual misconceptions regarding the comparative size of countries. A single scale serves for the colored maps of all the grand divisions; a single but larger scale, for the maps of the United States and Europe; and a single but still larger scale, for the sectional maps — with the exception of that of New England, which is drawn on three times the scale of the others. On the physical maps, the relief features are shown by contour lines in the manner now used on the best topographical maps issued by the government.

The pictures have been generally reproduced directly from photographs, and have been selected and arranged solely for the purpose of *illustrating* the accompanying text. The photograph of the Great Barrier reef reproduced on page 18 was kindly loaned by the American Museum of Natural History, New York city.

Acknowledgments are due to Dr. C. T. McFarlane, Principal of the State Normal and Training School at Brockport, New York, for valuable suggestions and assistance in revising and perfecting the manuscript.

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THE EARTH AS A WHOLE

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NATURAL SCHOOL GEOGRAPHY

INTRODUCTORY

We have already learned much about the geography of the neighborhood in which we live — its surface, its climate, its products, and the occupations of the people; we have also learned something about the countries of other parts of the world and the peoples who live in them. To know about these is a very important part of the study of geography, but it is only a part.

As we have already learned, some parts of the earth are cold, while other parts are hot; some places are very rainy, but in others rain is practically unknown; some regions are level, others are rugged and mountainous. Some lands are densely inhabited, but in others few people live. In some places, too, the people are engaged in farming; in others the only pursuit may be mining or perhaps commerce. One country may produce wheat as its chief crop; another, coffee; still another, cotton.

Now these differences, and hundreds of others which might be noted, do not occur by chance, but are the result of definite causes. These causes are generally very complex and difficult to trace, but some of them usually have to do with the climate, or the surface features, or the movements of the earth — that is, with geography. In this book we shall learn how the geography of the various countries has helped to determine their useful products, and the occupations of the people.

We may possibly regard the country in which we live as one that is separate and distinct from all other countries. In a certain sense this is true. But the various countries are scarcely more separate and distinct than are the hands, wheels, and springs of a clock.

We may certainly learn something by studying the parts of a clock separately, but we can get a real knowledge of the use of the parts only when we see them properly together, in running order, so that each part is doing such work as its shape, position, and character fit it for.

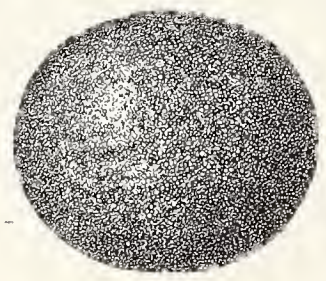
So, too, the various countries, although they differ in form, surface, climate, and position, are all parts of the planet Earth. Each is affected by the movements of the earth, and they are all warmed, watered, and made habitable by means of the earth's atmosphere and its circulation. Therefore, in order to study the geography of the various countries with understanding, we must first learn something of the earth as a whole — its movements, surface features, climate, and conditions of life.

FORM AND SIZE OF THE EARTH

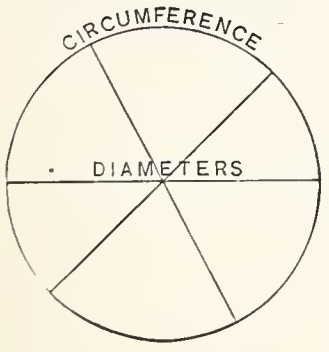
1. When we look over a wide level country, or over the ocean, the earth appears to be flat, but for several reasons we know that its surface is curved. (1) When a ship sails away from us, we can see the sails and the tops of the masts long after the lower part of the ship is out of sight. (2) People have traveled in one general direction entirely around the earth to the place from which they started. (3) When the earth passes between the sun and the moon, the earth's shadow, which falls on the moon and darkens, or *eclipses*, it, is seen to be always round. As a sphere is the only body whose shadow is always round, we know that the earth is spherical.

But the earth is not a perfect sphere. It is slightly flattened on two opposite sides, so that its shape is somewhat like that of an orange.

2. The *diameter* of the earth, or the distance through its center from side to side, is about 8000 miles; its *circumference*, or the greatest distance around it, is about $3\frac{1}{7}$ times its diameter.



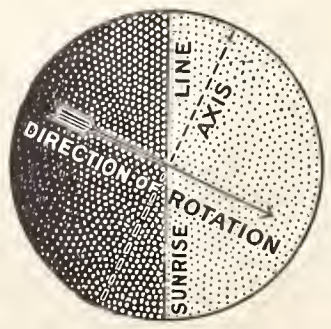
3. We are likely to wonder why the people and loose objects do not slide off the earth or drop away from the other side of it. If you raise a stone from the ground on any side of the earth and then let go of it, it falls to the ground again. The earth has the power of pulling objects toward itself, and the pull is so strong that it keeps loose bodies close to the earth's surface. This wonderful power is called *gravity*.



Tests. How do we know that the shape of the earth is spherical? How long is the earth's diameter? How many miles in the earth's circumference? A fast steamship sails about 500 miles a day; how long would it take to sail the greatest distance around the earth? What is meant by gravity? Of what use is it?

ROTATION OF THE EARTH

4. The earth is always spinning, or *rotating*, slowly upon its shortest diameter, or *axis*. The rotation of the earth causes the succession of *day and night*, and aids us in determining *time*, *direction*, and *location*.

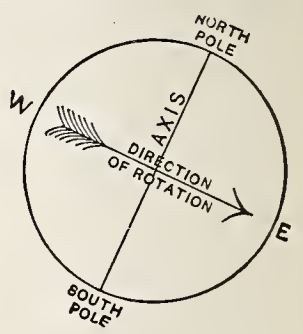


5. **Day and Night.** The earth gets most of its light and heat from the sun. Only the side of the earth toward the sun is lighted; the other side is in darkness. As the earth rotates, any place on the surface is thus bathed in daylight while that part of the earth is turned toward the sun, but is in the darkness of night when it is turned away from the sun.

Sunrise or sunset at any place occurs when that place is carried by rotation across the line which divides the light from the dark side of the earth.

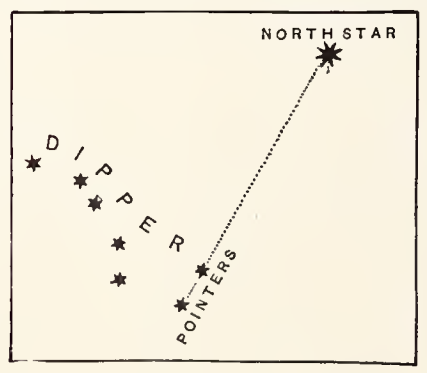
6. **Time.** The time required by the earth to make one complete rotation is a *day*. For convenience we divide a day into twenty-four equal parts, called *hours*, which are subdivided into *minutes* and *seconds*. Clocks are machines which indicate the speed of the earth's rotation in such a way that we can easily determine the passage of these subdivisions of a day.

7. **Direction.** The direction in which the earth rotates is called *east*. As the earth turns eastward, the sun appears to move across the sky in the opposite direction, which is called *west*. *North* is the direction on the earth's surface from any place to the end of the earth's axis called the *north pole*, while *south* is the direction to the other end of the axis, called the *south pole*. If you stand facing east, your left side is toward the north pole, and your right side toward the south pole. *Northeast* is the direction between north and east; *southeast*, the direction between south and east; etc.



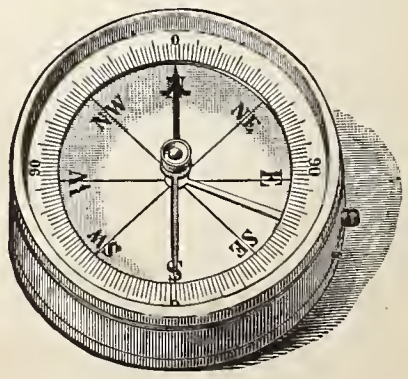
8. The earth rotates so slowly that it is hard to tell at once which way it is moving, but there are easy ways to find directions.

(1) About the 21st of March and the 21st of September the sun rises exactly in the east, and sets exactly in the west. During our summer months the sun rises a little north of east; and during our winter months, a little south of east.



(2) In our part of the world the sun at noon casts the shadow of any upright object toward the north.

(3) In our country the North Star may be found any clear night by the aid of two stars (the "Pointers") in the star group called "the Dipper." The direction along the earth's surface toward the North Star is north.

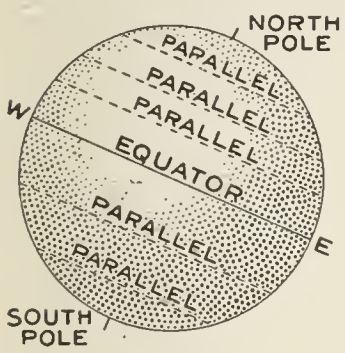


COMPASS.

(4) The directions may be found very closely at any time by means of the *compass*. This is a little bar of magnetized steel, called the magnetic needle, balanced on a pivot so that it can swing freely. When the needle comes to rest, it always points to a place near the north pole.

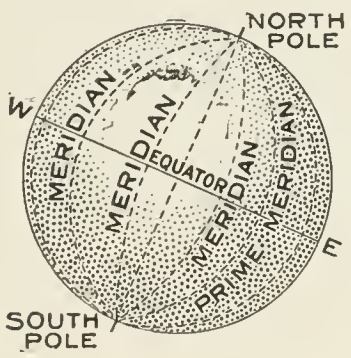
9. Location. A sphere is equally curved in all directions, and has neither corner nor edge from which to begin measuring or locating points on its surface; therefore it would be hard to describe the location of places on the spherical earth, were it not for the earth's rotation. Rotation fixes the position of the earth's axis, and the ends of the axis, or poles, are points from which we may locate any other place on the surface. We imagine a line drawn around the earth halfway between the poles. This line is called the *equator*, because it divides the earth's surface into equal parts — a northern and a southern half, or *hemisphere*.

10. To locate a place in a north and south direction, we indicate its distance north or south of the equator. This distance is called *latitude*. Places north of the equator are in north latitude; those south of the equator, in south latitude. All places on the same side of the equator and at the same distance from it are in the same latitude. A line connecting such places is parallel with the equator, and so such a line is called a *parallel of latitude*. Any number of such parallels may be drawn. They all extend exactly east and west.



PARALLELS.

11. At all places on the same north and south line noon occurs at the same instant. A north and south line extending from the north pole to the south pole may therefore be called a midday line, or *meridian*. We may imagine a meridian to pass through any place on the earth. The meridian which passes through Greenwich, a part of London, is taken as the *prime meridian*.



MERIDIANS.

A place is located in an east and west direction by indicating the distance of its meridian east or west of the prime meridian. This distance is called the *longitude* of the place.

12. Thus we can describe the exact location of any place on the earth's surface by stating its latitude and longitude; that is, its distance north or south of the equator, and its distance east or west of the prime meridian.

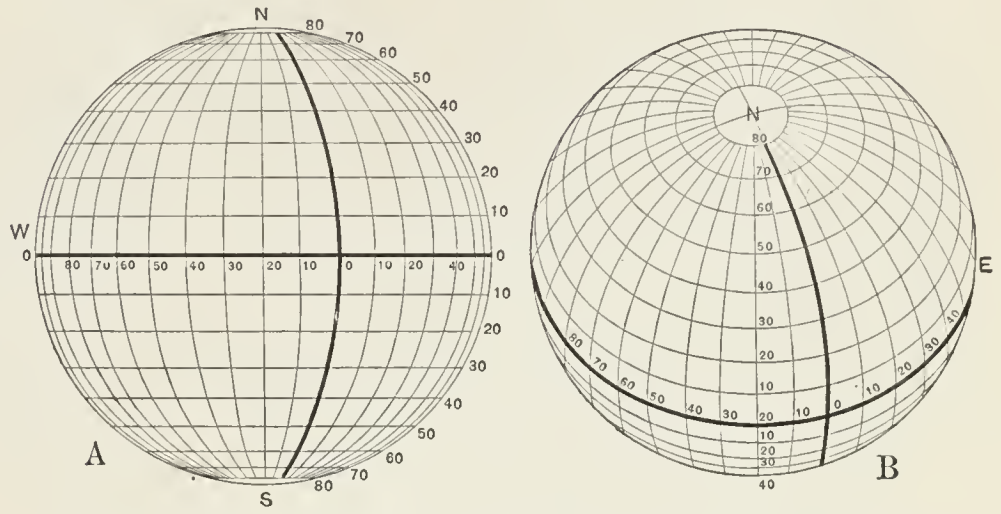
13. Measurement of Latitude and Longitude. Latitude and longitude are measured in *degrees*.

The degrees of latitude are numbered from the equator north or south. There are ninety degrees (90°) from the equator to either pole.

Thus a place 10° north of the equator is said to be in latitude 10° north; a place 20° south of the equator is said to be in latitude 20° south; etc. The north pole is in latitude 90° north, and the south pole, in latitude 90° south. (See diagram at the top of next column.)

Put your pencil on the parallel of 10° south latitude; of 30° north latitude. Show where the parallel of 45° north latitude should be drawn.

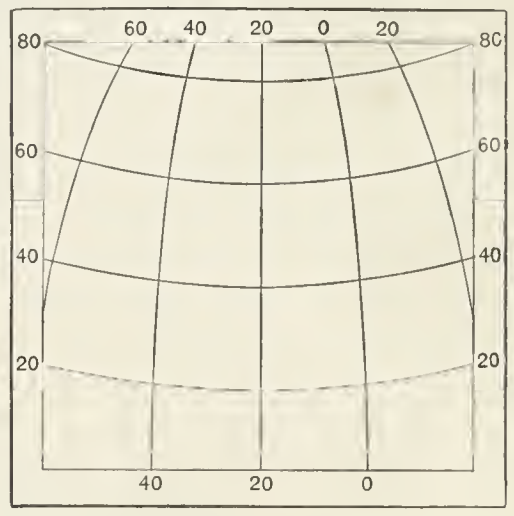
The degrees of longitude are numbered from the prime meridian east and west halfway round the earth to the meridian of 180°.



A place 40° east of the prime meridian is said to be in 40° east longitude, and a place 70° west of the prime meridian, in 70° west longitude. The meridian of 180° east longitude is the same as the meridian of 180° west longitude.

Put your pencil on the meridian of 60° west longitude. Locate a point in 35° north latitude and 65° west longitude.

14. Several parallels are usually drawn on maps, sometimes as straight lines, but generally as curved lines, as shown in this diagram, and the distance of each in degrees from the equator is marked on the side margins of the map. Several meridians are also usually drawn on maps, and the distance of each in degrees east or west of the prime meridian is marked on the top and bottom margins of the map.



It should be borne in mind that east or west on a map is always along the parallels, no matter how curved they may be; and that north or south is always along the meridians.

Tests. Define axis; poles; rotation. Explain day and night. Define a day; its divisions. How is a clock related to rotation? Name and define the chief directions. Give four ways of finding them. What is the equator? How does its location depend upon rotation? What is a hemisphere? What are parallels? meridians? What is latitude? longitude? How are they measured?

Supplemental Work. Illustrate the succession of day and night by means of a ball and a candle. If your house fronts south, are the sunny rooms at the front or at the back? Why? On a clay ball draw the equator, parallels, and meridians.

Through how many degrees of longitude does rotation carry a place in an hour? When it is noon on any meridian, what time is it on the meridian fifteen degrees to the east? thirty degrees to the west? one degree to the east? When it is noon on any meridian, in which direction, and how many degrees distant, is the meridian on which it is 6 A.M.? 3 P.M.? 3 A.M.? 12.20 P.M.?

TOPICS FOR ORAL OR WRITTEN REVIEW ON THE EARTH

I. FORM. Apparent; real.
II. SIZE. Definition and length of diameter; of circumference.
III. GRAVITY. Facts about it; use.
IV. ROTATION. Four things depending on it; explanation of each.

WESTERN HEMISPHERE

EASTERN HEMISPHERE

NORTH POLE

SOUTH POLE

ARCTIC OCEAN

ANTARCTIC OCEAN

PACIFIC OCEAN

ATLANTIC OCEAN

INDIAN OCEAN

ASIA

GREENLAND

ICELAND

BRITISH ISLES

IRELAND

EUROPE

EURASIA

CONTINENT

Bering Sea

Bering Strait

NORTH AMERICA

WESTERN CONTINENT

Gulf of Mexico

WEST INDIES

Caribbean Sea

Isthmus of Panama

SOUTH AMERICA

CONTINENT

Cape Horn

Mediterranean Sea

Isthmus of Suez

Red Sea

AFRICA

Cape of Good Hope

EAST INDIES

AUSTRALIAN CONTINENT

AUSTRALIA

TASMANIA

EQUATOR

160 180 160 140 120 100 80 60 40 20 0 20 40 60 80 100 120 140 160

EQUATOR

THE SURFACE OF THE EARTH

15. The surface of the earth is not perfectly smooth and evenly curved. Some parts bulge out slightly, forming *regions of elevation*, while other parts are slightly sunken, forming *regions of depression*. The regions of depression are covered with salt water which forms the *sea*, while the parts of the earth's surface which protrude above the surface of the sea form the *land*. About one fourth of the earth's surface is land.

16. Most of the land in the world lies in three great continuous masses, or *continents*; the remainder consists of many smaller masses, or *islands*. The Western Continent is on the side of the world called the *western hemisphere*; the Eastern Continent and the Australian Continent are on the opposite side of the world, or the *eastern hemisphere*.

17. In the hemisphere maps at the top of the opposite page, the blue color represents the sea and the other colors represent the land. Name the two *grand divisions* of the Western Continent. By what narrow neck of land, or *isthmus*, are they connected? What group of islands lies between these grand divisions? What large island is northeast of North America? What island near Greenland is partly in the eastern and partly in the western hemisphere?

What isthmus is at the place where the Eastern Continent is nearly separated into two parts? What grand division is southwest of the Isthmus of Suez? The remainder of the continent is the grand division Eurasia; but Europe, the western part of Eurasia, is usually considered as a grand division, and Asia, the eastern part, as another grand division. What islands are near the coast of Europe? A small part of Asia extends into the western hemisphere; by what narrow passage of water, or *strait*, is it separated from the Western Continent? What island group, or *archipelago*, lies between Asia and Australia?

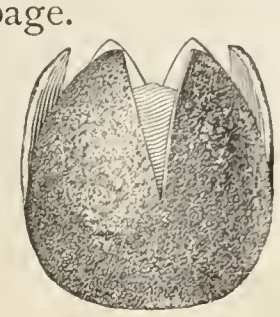
In which grand division do we live? Examine the table on p. 153, and make a list of the grand divisions in the order of their size.

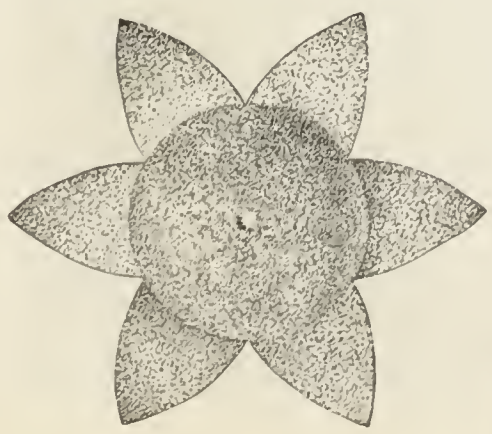
What is the name of the part of the sea surrounding the south polar region? From this broad expanse of sea great *oceans* extend northward between the continents. What ocean extends northward between America and Africa? between Africa and Australia? between Australia and America? Which of these oceans is largest? Which is narrowest? Name the branch of the Atlantic Ocean which surrounds the north pole. From the table on p. 153 make a list of the oceans in the order of their size.

Supplemental Work. Make a sketch from the map, showing an island, an isthmus, a strait, and an archipelago. Model these forms.

THE CONTINENTAL PLATEAU

18. The Star-shaped Map. If we peel one half of an orange in gores, and then turn back the skin, as in the pictures below, we bring the skin of the whole orange into view. On the same principle a single map showing the surface of the whole round earth may be drawn as at the bottom of the opposite page.





The north pole is represented at the center of the map; hence *north* on this map is toward the center from all sides, and the direction of the earth's rotation, or *east*, is shown by the arrow points. The northern hemisphere is included in the largest continuous circle, which marks the equator, and the surface of the southern hemisphere is represented as divided into gores and turned up from below to form the six points.

Find the Arctic Ocean on the star map. What two grand divisions of land nearly surround the Arctic Ocean? With what ocean has the Arctic a broad connection? With what ocean is it connected by Bering Strait? What is a strait? Find the islands Greenland, Iceland, and the British Isles. Find South America; the West Indies; Africa; Australia; the East Indies; the Indian Ocean.

19. Regions of Depression and of Elevation. In the part of the sea which is represented by the darker blue, the water is very deep, the average depth being about two and one half miles. This is the true region of depression on the earth's surface.

The lighter blue represents places where the sea is much shallower, the water being less than one mile deep. If the surface of the sea were to sink one mile lower than its present level, this light blue region would become land, and all the continents would be united into a single great land mass, although the parts of the sea colored dark blue would still have an average depth of one and one half miles. Thus not only the land surface but also the bottom of the shallower part of the sea (the light blue) may be considered as forming a single great region of elevation.

20. Continental Plateau. Any broad region of elevation may be called a *plateau*; and as this great region of elevation contains all the continents, it is called the *continental plateau*. The submerged part of the continental plateau, which borders the continents, is called the *continental shelf*. On the continental shelf are located all the large and many of the small islands of the world; hence these islands are called *continental islands*. The continental plateau covers a considerable portion of the northern hemisphere, and at three places extends into the southern hemisphere. It includes almost all the land in the world, except many very small islands in mid-ocean, which are called *oceanic islands*.

21. Continents and Grand Divisions. Near the north pole and among the East Indies, the waters of the sea extend entirely across the continental plateau, forming great *continental seas*. These seas divide the continental plateau into the three great land masses, or continents.

The Caribbean, Mediterranean, and Red seas carry the water of the sea *nearly* across the continental plateau; they lie between and thus mark off the natural grand divisions of the Western and Eastern continents — North and South America, Eurasia and Africa.

TOPICS ON THE DISTRIBUTION OF LAND AND WATER

I. Continental Plateau. Position. Continents. Continental seas.

II. Islands. Continental. Oceanic.

III. The Sea. Position. Depth. Oceans.

HIGHLANDS AND LOWLANDS

22. The surface of the land rises from the sea very gradually in some places, and very abruptly in others, but the highest regions are always found some distance back from the coast. In the high regions of the earth a few places reach elevations of about five miles above the sea, but the average elevation of the land is less than half a mile. All the land below this average elevation is spoken of as *lowland*, and is indicated by green on the physical maps in this book. All the higher parts of the land are called *highland*, and are colored brown or buff on the physical maps.

Islands off the Coast of Maine.

Which side of the Western Continent is mostly lowland? (See maps, p. 8.) Which side is mostly highland? Toward which ocean is the highland side of the Western Continent? Toward which oceans are most of the highlands of the Eastern Continent?

23. **The Great Highlands.** As shown on the star map, the great highlands of the continents form an almost continuous horseshoe-shaped curve from Cape Horn to Cape of Good Hope.

24. **The Broad Lowlands.** On the outside of the highland curve the slope is generally short and steep to the Pacific and Indian oceans. On the inside of the horseshoe, however, the slope is long and gentle to the Atlantic and Arctic oceans. This slope includes most of the broad lowlands of the continents, together with several small areas of highland. In Australia the highlands are near the Pacific, and from them broad lowlands extend to the Indian Ocean.

In following the highland horseshoe curve around from Cape Horn to the Cape of Good Hope, note and name the only three places where you would be obliged to descend from the highland. It will be seen that the only breaks in the highland curve are at the places where you leave one grand division to enter another.

The Australian branch of the continental plateau is especially low; most of the northern part is covered by the sea, the remaining small areas forming the islands of the East Indies.

Tests. Define lowlands; highlands. Where are the great highlands of the continental plateau? the smaller areas of highland? Describe the two chief slopes of this plateau.

Supplemental Work. Model a plateau with a short, abrupt slope on one side, and a long, gentle slope on the other.

UPHEAVAL OF THE LAND

25. **Changing Levels of the Land.** It is believed that in past ages the surface of the continental plateau has been at times higher and at other times lower than it now is. Much of the present land was once so low that the water

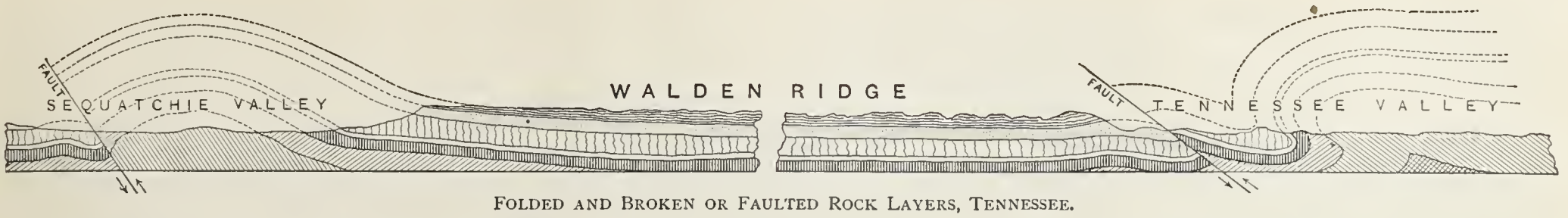
A Promontory on the Coast of Maine.

covered it, forming continental seas; and parts of the plateau now covered by water were once so high as to connect land masses that are now separate. Thus North America may have been connected with Eurasia in the Arctic regions, and southeastern Asia may have been connected with Australia.

26. It is well known that such upward and downward movements of the land are *still taking place in most parts of the world*, though each movement may be so slight that it can not be seen. The jar of such a slight movement, however, may cause, over a wide district, an *earthquake*, which may be so violent as to shake down houses. Even though each movement can not be seen, hundreds of slight movements may, after many centuries, elevate the sea bottom into a mountain range.

A Fiord in Norway.

27. **Upheaval of the Land.** It is thought that *every* part of the land was covered by the sea at some time in the past and became land by being gradually upheaved above the sea. Earthquakes, though common in all parts of the world, are now most frequent near the Pacific coast and in the great highlands. Upheaval is therefore thought to be most active nowadays in those regions.



FOLDED AND BROKEN OR FAULTED ROCK LAYERS, TENNESSEE.

28. Sinking Coasts. The surface of the land is seldom exactly smooth or level. It almost always consists of higher places, or *hills*, with lower places, or *valleys*, between them.

Therefore, when a coast region is slowly sinking beneath the sea, the valleys are first submerged. Up these the water may extend far into the land. Such arms of the sea form *gulfs* or *bays* if they are wide, and *fiords* or *estuaries* if they are long and narrow.

NEARLY LEVEL ROCK LAYERS, AUSABLE, N.Y.

The higher parts of the coast, left projecting into the sea between the indentations, are called *peninsulas*, and the ends of these form high capes, or *promontories*. Some peninsulas are connected with the mainland by only a narrow neck of land, or *isthmus;* and when by continued sinking the water covers the isthmus, the highest part of the former peninsula is left as an *island*.

Thus a sinking coast is usually irregular, with many bays and peninsulas, and is quite often fringed with islands.

29. Rising Coasts. The sea bottom, even near the coast, is much smoother and more nearly level than the surface of the land. It has very few short and steep slopes such as are seen on the ordinary hills and valleys of the land.

Therefore, when the smooth sea bottom along the rising margin of a continent is brought above the surface of the sea, it usually makes a comparatively even and regular coast line.

The coasts of the Arctic Ocean and of the North Atlantic are very irregular, and long stretches of these coasts are known to be slowly sinking. The Pacific coast of America is generally quite regular, and seems to be rising.

Tests. How are earthquakes often caused? Explain the effect of sinking on a coast; the effect of rising.

Supplemental Work. Find out something about the San Francisco earthquake of 1906. Make a sketch from the map (p. 8), showing a gulf or bay, a peninsula, and a cape. Model in a pan, with clay or putty, an island having a regular coast line but an irregular surface. Show, by pouring water into the pan, how the sinking of the island would make the coast quite irregular.

MOUNTAINS

30. Level Rock Layers. In many places the layers of bed rock which are found beneath the soil have been but little disturbed in the upheaval of the land, and are still nearly level as they were when beneath the sea. *This is often the case in lowland regions.*

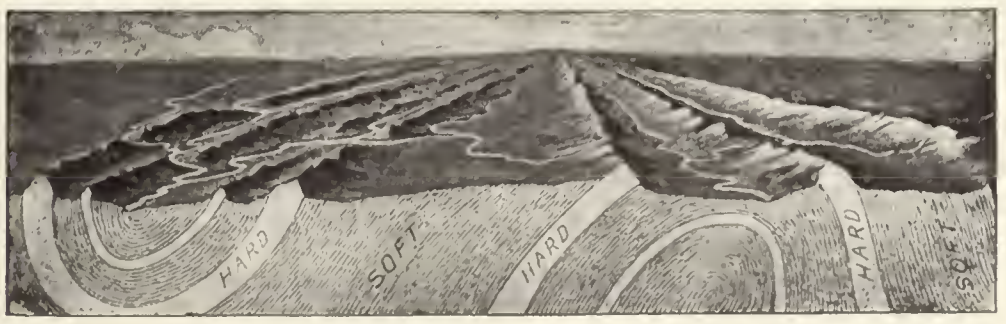
31. Rock Folds. In other places the layers of bed rock have been upheaved into waves or folds. A single rock fold of this kind is shown in the picture. Often there

FOLDED ROCK LAYERS, MARYLAND.

are several folds side by side. The rock layers in the folds are often cracked and broken across, and the layers on one side of a crack, or *fault*, have slid up higher than the same layers on the other side, as shown at the top of the page. In the gradual formation of these faults, probably hundreds of earthquakes have occurred.

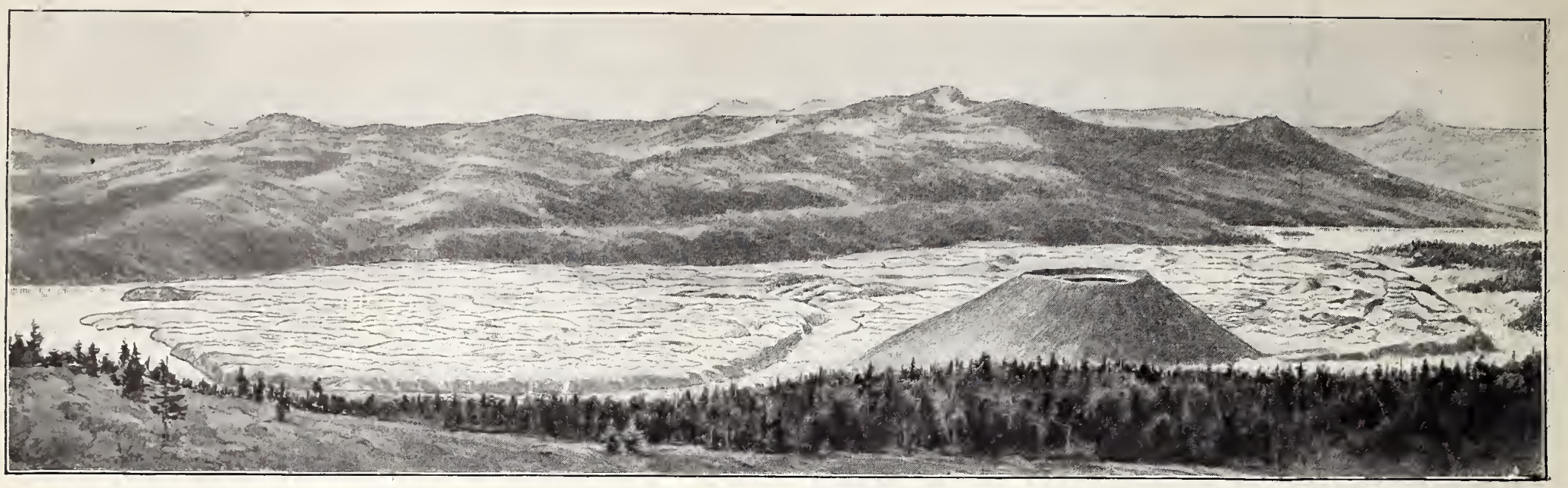
32. Mountains. Such disturbance of the rock layers is nearly always found in mountain regions, for *most mountains are the harder layers of these rock folds left projecting high above the surrounding country*, — the softer layers having been gradually worn off and washed away by the rain and the streams.

If the top of the fold has been worn away, the projecting layers of harder rocks in its two sides may form nearly parallel ranges of mountains, as in this diagram.



ILLUSTRATING PARALLEL RIDGES FORMED BY WORN ROCK FOLDS.

As there are often several folds side by side, mountains usually occur in roughly parallel ranges. A great region



A Little Volcano in California, showing an Old Outflow of Lava which by damming a Valley caused the Formation of Two Lakes.

of folded rocks may produce a series of ranges, forming a *mountain chain* or *system* several thousand miles long.

33. Volcanoes. At many places in the world, steam and white-hot melted rock, or *lava*, occasionally force their way out of the earth through cracks, or vents. Such vents are called *volcanoes*.

The lava which issues from the volcano cools and generally accumulates around the vent, forming a *volcanic mountain*, or *cone*. So the opening, or *crater*, of a volcano is usually near the top of a mountain peak.

Sometimes the lava issues quietly and flows in great streams over the surrounding country, where it cools into sheets of hard lava rock. Generally, however, there are terrific underground explosions of the steam, which hurl the melted lava high into the air, where it cools and falls over a wide region, as a rain of rock fragments.

These explosions are generally so violent that they jar the whole region about the volcano, and hence explosive eruptions are frequently accompanied by earthquakes.

After perhaps centuries of occasional activity, the eruptions of a volcano may cease entirely. The volcano is then said to be *extinct*.

Volcanoes are supposed to be one of the results of the upheaval or the sinking of the earth's surface. Lava is found in nearly every mountain region where the rocks are greatly disturbed, and most of the *active* volcanoes occur near the Pacific margin of the continental plateau. Volcanoes also occur far from the continental plateau on the sea bottom, where they build up huge cones, whose tops mark the location of oceanic islands.

Tests. What is a mountain? a range? a system? Define a volcano; its features.

Supplemental Work. Read in Baldwin's Readers, 5th year, about the destruction of Pompeii. Read chapter 43 in "Carpenter's Geographical Reader, Europe"; chapter 20 in "Carpenter's Geographical Reader, Australia."

TOPICS ON EFFECTS OF UPHEAVAL

I. Continental Plateau. Continents. Grand divisions. Continental islands.

II. Surface Movements. Results: on surface; on coast. Indications: earthquakes; volcanoes.

III. Surface Forms. Great highlands: location; shape; divisions. Slopes: short; long. Broad lowlands: location; extent.

WEARING AWAY OF THE LAND BY WEATHERING

34. Wearing away of the Land. We have learned that the gradual rising and sinking of the earth's surface have resulted in the upheaval of parts of the sea bottom to form land. But the surface of the land is constantly being worn away, and made lower, by the action of the weather and of water and ice. This wearing away of the land is called *erosion*.

Erosion goes on very slowly, bit by bit, but it goes on all the time. In the course of many years it hollows out deep valleys in the land, and wears away mountains which are composed of the hardest rock.

35. Rock Waste and Soil. When the surface of rock is warmed or cooled, as the weather changes, it expands or contracts slightly. This may break off larger or smaller pieces. Water freezing and expanding in rock crevices breaks off other pieces. Sand blown by the wind against rocks wears them slowly away. Rain water slowly dissolves the natural cement that binds together the harder particles of some rocks, and the rock then crumbles.

By such breaking up, or *weathering*, of the solid rock most of the land is kept covered with a layer of rock fragments, or *rock waste*. Near the surface this is usually quite fine and, when mixed with decaying animal or vegetable matter, forms the *soil*. At a slight depth the fragments are larger, while deeper still is the solid bed rock.

Sand Dunes, Columbia Valley, Oregon.

36. Movement of Rock Waste down the Slopes. The soil, sand, and rock fragments near the surface are gradually moved down the slopes of the land by the splash of rain drops, the expansion of water freezing in the soil, the movement of worms, the growth of roots, and the plowing of the soil by man. When this

movement uncovers the larger fragments of rock waste beneath, they too are weathered into smaller particles which, in turn, travel down the slope.

Thus the soil and rock waste are constantly moving down the slopes of the land, — more rapidly on steep than on gentle slopes. Therefore the soil is usually thicker on gentle slopes and on lowlands, than on steep slopes and on highlands.

37. Movement of Rock Waste by the Wind. Clouds of dust in the air are simply particles of rock waste being carried along by the wind. In dry regions where there is little vegetation, and on the sandy shores of lakes and the ocean, much fine rock waste or sand is thus transported by the wind, and often piled into ridges, called *sand dunes*.

Tests. Define erosion; rock waste; soil; dunes. How is rock waste formed? How are soil particles disturbed?

Supplemental Work. Observe at a road cutting, or newly dug cellar, the layers of soil, rock waste, and bed rock.

Read chapter 6 in "Carpenter's Geographical Reader, South America."

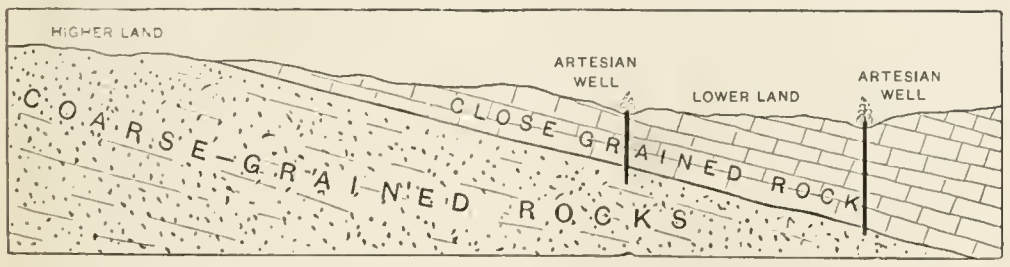
WEARING AWAY OF THE LAND BY GROUND WATER

38. Ground Water. Much of the rain that falls on the land sinks into the ground, passing through the rock waste and penetrating the bed rock beneath, often to a great depth. Even if the soil is dry at the surface, there is usually ground water at a slight depth. It is ground water that supplies all springs and wells.

39. Springs and Wells. The ground water makes its way very slowly through the earth from the higher to the lower lands, where it may flow out at the surface, forming a *spring*. Spring water is thus rain (or snow) which, in the form of ground water, has made a slow journey, often of many miles.

Some springs and wells dry up in a time of drought; and all of them would eventually dry up if the ground water from which they draw their supply were not frequently replenished by rain.

In some regions where the bed rock is too close-grained to allow the ground water to pass through it easily, water is obtained by driving a pipe well through the close-grained rock into some layer of coarse-grained rock beneath, which gets a supply of ground water from a higher region. The water rises in such *artesian wells* and sometimes overflows at the surface, forming an artificial spring. (See diagram.)



Illustrating Artesian Wells.

40. In some places *hot springs* occur. These draw their supply from ground water that is in contact with heated rock, often at a great depth. The water feeding some springs is so hot that as it nears the surface part of it, at short intervals, suddenly turns into steam and throws the rest high into the air. Such spouting hot springs are called *geysers*.

Old Faithful Geyser, Wyoming.

41. In passing through the small pores and crevices of the rocks, ground water is thoroughly filtered, and consequently the water of springs and wells is usually very clear. Though clear, it may contain much mineral matter, such as salt, sulphur, lime, or iron, which it has dissolved from the rocks through which it has passed. Such mineral spring water is frequently used for medicinal purposes.

42. Work of Ground Water. Some kinds of minerals, especially limestones, are easily dissolved by water. In regions where the bed rock is limestone the ground water often dissolves and carries away so much of it as to leave great underground cavities and galleries, perhaps many miles in extent. Most *caves* and *caverns*, nearly all of which occur in limestone regions, are caused in this way.

In time the roof falls in, and the cavern becomes an open valley. In some cases a section of the roof may remain standing for a time after the rest has fallen, thus forming a *natural bridge* across the valley.

43. Hot water, which dissolves all kinds of rock more readily than cold, usually brings to the surface a great deal of dissolved mineral matter. When hot water containing much mineral matter cools, part of this matter is deposited in solid form. Such mineral deposits are often found about hot springs. Sometimes they are highly colored and the deposits take various beautiful forms, such as basins and terraces, as shown in the picture.

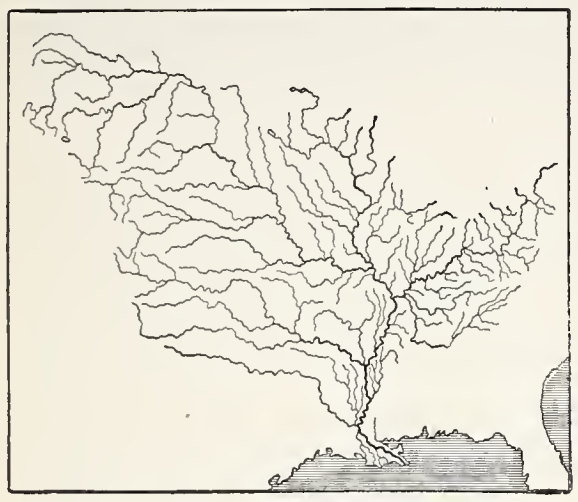
Hot Spring Deposits, Yellowstone Park, Wyoming.

Tests. Define and explain the formation of a spring; an artesian well; a geyser; a mineral spring; a cave; a natural bridge.

Supplemental Work. Find out about the geysers of Yellowstone Park, and about Mammoth Cave or Luray Cavern.

STREAMS AND LAKES

44. Streams and Stream Systems. Nearly every spring is the beginning, or *source*, of a stream of water which flows from it. The source of a stream, however, may be a marsh, a mass of melting snow and ice, or simply the water from a passing shower.



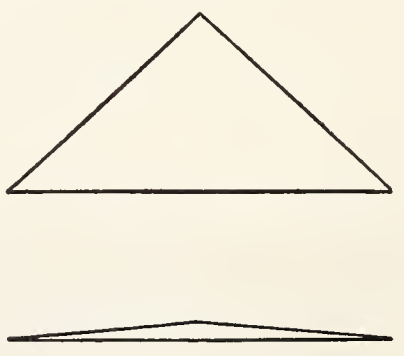
THE MISSISSIPPI RIVER SYSTEM.

Streams are usually quite small near their sources. They seek the lowest places in which to flow, usually the bottom of a valley. As they advance, several from either side of the valley unite, thus forming larger streams. The water from thousands of such side streams, called *branches* or *tributaries*, gradually swells the main stream until it may become a mighty river, which at length may flow into the sea.

A stream with all its branches, and all the smaller tributaries of each branch, is called a stream *system*.

45. Basins and Divides. All the region from which water in time of rain might flow into a stream is called the *drainage basin*, or *basin*, of that stream. Hence the basin of any stream includes the basins of all its branches.

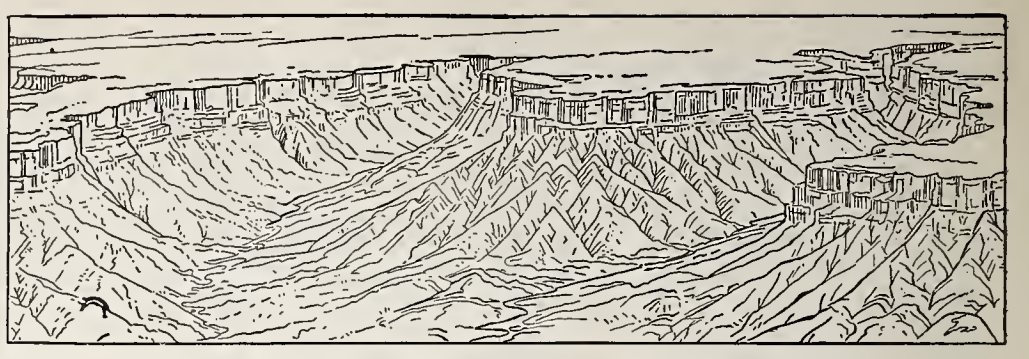
Any region from which the slope is downward in two opposite directions, is called a water parting, or *divide*, since it divides the water which flows down one side from that which flows down the other. The top of every range of hills and mountains is a divide, but so too is the crest of every low swell of land — from both the water flows away in opposite directions.



Adjacent stream basins are separated by divides.

46. Lakes. An obstruction or dam across a stream valley causes the stream to spread out, forming a *pond* or *lake*. The *inlets*, or streams flowing into a lake, must raise its surface until the water can escape over the obstruction before an *outlet* stream is formed, flowing from the lake.

47. Salt Lakes. From every moist surface, water is generally passing into the air as invisible vapor. By this process, called *evaporation*, considerable water is taken from the surface of streams and lakes, especially when the air is dry (§ 88, p. 22). In very dry regions



ILLUSTRATING THE EROSION OF VALLEYS.

lakes usually have no outlets, because evaporation prevents the water from rising high enough to flow over the obstruction.

When a lake loses water by evaporation only, the dissolved mineral matter brought in by the inlets gradually accumulates until the lake water becomes very salt and bitter.

Rivers which flow into a very dry region may lose so much water by evaporation that they grow smaller as they advance, and finally may disappear entirely, leaving a coating of salt on the dry bed.

Tests. Define stream; source; branch; river; system; basin; divide; lake; inlet; outlet. Explain the formation of salt lakes.

Supplemental Work. After a rain, find in a road or street a little system of streams; sketch it; and model its basin.

WEARING AWAY OF THE LAND BY STREAMS

48. The Formation of Valleys. Notice the water flowing in a roadside ditch or street gutter, after a shower. It is very muddy. If a boy stands barefoot in such a ditch or gutter, he can feel little hard particles swept against his feet by the rush of the water. If a tumbler filled with muddy water is set aside for a few hours, the water becomes much clearer, while the particles of soil and sand which made it appear muddy settle to the bottom of the glass as a deposit of fine rock waste.

49. Much rock waste from the surface of the land near by is swept into every stream and carried along by its current; the amount so taken being greater in wet than in dry weather. As a result, the valleys of streams are slowly growing *wider*, and the intervening hills and uplands are slowly growing narrower and lower.

As the particles of rock waste are being carried along by the current, they strike against the bottom of the stream, loosen and detach other particles from it, and thus slowly wear the bottom away. The result is that the valley is slowly made *deeper*.

Although these processes are slow, they are constant and have been going on for a very long time. It is in this way that every valley in the world has been made, either wholly or in part, by the stream which flows along its bottom.

50. Narrow and Wide Valleys. A swift stream can wear away its bottom faster than a stream with a gentle current, because it can carry larger pieces of rock waste, and hit harder blows on its bottom.

In the uplands, near the sources of streams, because the slopes are steep and the streams swift, valley deepening is apt to go on more rapidly than valley widening, and the valleys are generally narrow, with steep side slopes. Very deep and narrow valleys are called *canyons*.

Grand Canyon of the Colorado River.

When streams reach the lower lands, they are larger and hence may carry along more rock waste; but the current is slower, the particles are smaller, and the cutting power is less. Here valley widening is apt to go on more rapidly than valley deepening, and the valleys generally are wide, with gentle side slopes. The word "valley" is often used to include the whole stream basin (§ 45).

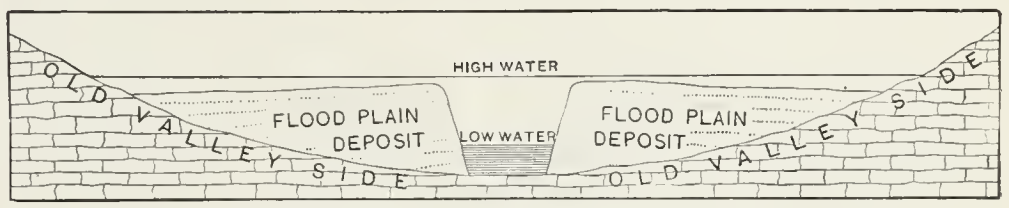
A Wide and Comparatively Shallow Valley, New York.

51. By the gradual deepening and widening of valleys, the intervening uplands may in time be carried away entirely, and a wide region, once hilly or mountainous, may be thus reduced to a nearly flat lowland.

52. **Flood Plains.** The rapid melting of snow or a great fall of rain in a stream basin causes the stream to rise, and perhaps to overflow its banks, producing a flood. At such times the stream carries much rock waste and the water is very muddy.

Near the middle of the stream the water is deep and the current is swift, but on the overflowed banks it is shallow, and the current is so slow that much of the rock waste sinks to the bottom. This deposit appears as a layer of *alluvium*, or *sediment*, along either bank, when the stream subsides to its ordinary width.

The next flood leaves another layer of sediment on top of the first, and the next flood still another layer.

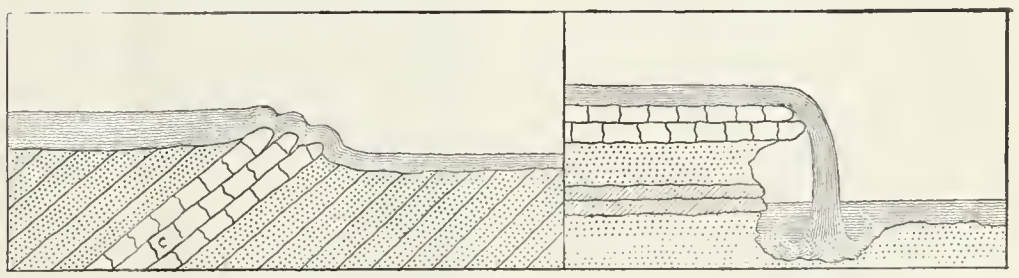


Illustrating Formation of Flood Plains.

Thus there is gradually built up by many floods a strip of "bottom land," or *flood plain*, on one or both sides of nearly every stream. Flood plains are usually larger near the mouth than near the source of a stream.

53. The flood plain, though nearly level, is often a little higher near the stream than along its outer edge, where sluggish streams, called *bayous*, are often found.

54. As the flood plain is composed of very fine particles of rock waste, it is usually very fertile, but it is subject to overflow, and is very easily undermined and washed away by the main stream in time of low water. For this reason a large stream in a wide flood plain is usually very crooked. Its course is a series of great bends, called *meanders* or *oxbow loops*, and is constantly changing as the current wears away one bank or the other.



Illustrating Rapids and Cascades. Illustrating Cataracts.

55. **Other Stream Features.** When a stream in cutting down its bed encounters a very hard layer of rock, the deepening of the valley above its edge is retarded, while the deepening of the valley below continues. Thus the stream makes a sharp descent at the edge of the hard layer, forming *rapids* or *cascades*, or perhaps a *cataract*.

A Small Cataract, Alabama.

56. Whenever the current of a stream carrying much rock waste is checked, part of the rock waste sinks to the bottom and forms a *bar*. Sand bars are thus formed at many places on the bed of a stream, but they are often washed away again when a flood increases the current and volume of the water.

57. When a stream carrying rock waste enters the sea or some other body of water in which there is little

Muir Glacier, Alaska.

or no current, the rock waste sinks to the bottom, and the deposit is apt to accumulate until it reaches the surface of the water. There it gradually forms a fan-shaped tract of low, swampy land, called a *delta*, which divides the stream at its mouth into several channels. By the continued deposit of sediment at the mouth of each channel the delta is gradually enlarged and is often made very irregular in shape.

Iceberg near Coast of Alaska.

Tests. How are valleys deepened? widened? How are canyons made? Define and explain the formation of flood plains; bayous; oxbow loops; rapids; cascades and cataracts; sand bars; deltas.

Supplemental Work. Draw a section of a highland valley; of a lowland valley. Draw a diagram and explain why a ledge of hard rock across a stream retards the deepening of the valley above.

Read pp. 136–138, 153–156, and chapter 26 in "Carpenter's Geographical Reader, North America."

WEARING AWAY OF THE LAND BY GLACIERS

58. **Glaciers.** In the cold polar regions, and even in warm countries near the high summits of mountains (§ 81), more snow falls than is melted. It thus accumulates from year to year until it becomes so deep and heavy that the lower part is pressed into solid ice, and is forced to move slowly forward down the slope of the land. Such a thick sheet of slowly moving ice is a *glacier*.

In parts of the polar regions a continuous or *continental glacier*, hundreds of feet thick, covers the entire land surface and moves slowly downward into the sea, where great fragments break off and float away as *icebergs*. In warmer latitudes *valley glaciers* only are found. These occupy mountain valleys, and usually melt away before reaching the lowlands or the sea.

59. **Work of Glaciers.** The rock waste — sand, pebbles, and even large masses of rock — under a glacier becomes embedded in the ice and is dragged forward by the glacier, scratching, polishing, and wearing away the bed rock beneath. Rock waste also rolls down on the surface of valley glaciers from the mountain sides. Much of this finds its way to the bottom through the numerous deep cracks which are opened in the ice by the slow movement of the glacier. Thus glaciers rapidly wear away the rock surface over which they move, and carry forward an enormous quantity of rock waste.

If the glacier descends into the sea, the rock waste which it carries is borne away by icebergs. If the glacier does not reach the sea, the rock waste is deposited along its melting end, as an irregular sheet of sand, gravel, bowlders, and clay, called *glacial drift*, or as an irregular range of hills, called a *terminal moraine*.

60. **The Glacial Period.** In northern Europe and in North America as far south as the Ohio and Missouri rivers, the surface of the land is covered with glacial drift and the remains of terminal moraines. There are many rounded bowlders of a different kind of stone from any of the bed rock in the neighborhood, and many peculiar whaleback-shaped hills or *drumlins*, composed of glacial rock waste. The bed rock of these regions, where it can be examined, is covered with glacial scratches, and there are more lakes in these regions than in any other parts of the world. Some of these lakes occupy basins in the bed rock, but most of them occupy depressions in the irregular surface of the glacial drift, or old valleys across which a deposit of glacial drift forms a dam.

Bowlders deposited by an Old Valley Glacier in California.

These peculiarities indicate that long ago there was a *glacial period* of time, during which the northern hemisphere was colder than it is now.

Great continental glaciers covered northern North America and northern Europe. The American glacier moved out in all directions from the Laurentian Plateau (p. 36), and is therefore called the *Laurentian glacier*. The European glacier is called the *Scandinavian glacier*, because it moved out in all directions from the Scandinavian peninsula (p. 108). These glaciers must have lasted thousands of years, but when the climate became warmer they melted away and left the glacial deposits spread over the countries which the ice had covered.

Tests. Where and how are glaciers formed? What work is done by them? What is an iceberg? Define glacial drift; terminal moraine.

WEARING AWAY OF THE LAND BY WAVES AND TIDES

61. Waves. The surface of any sheet of water is thrown into waves by the wind. Light breezes cause mere ripples, but storm winds may heave the surface of deep water into billows as high as a three-story house.

Waves raised by a storm in one part of the sea spread rapidly to a great distance, but even big waves do not affect the water to any great depth.

When a wave enters shallow water, its lower part drags on the bottom, while the upper part, rushing onward, falls forward, forming a *breaker*. Big waves drag on the bottom in deeper water than little waves, and hence may break farther from the land.

62. Tides. At many places on the seacoast the water gradually rises for several hours and becomes many feet deeper; then for several hours it gradually falls to about its former level; then it again slowly rises, and so on. This slow and regular rise and fall of the sea is called the *tide*. The rise is *flood* tide, and the fall, *ebb* tide.

63. The tides are caused chiefly by the action of the moon, which, like the earth, possesses gravity, or the

power to pull loose objects toward itself. The moon's gravity causes the surface of the sea to rise in two low but broad tidal swells, or waves, one on each side of the earth.

As the earth rotates, these waves travel over the surface of the sea. When the crest of one of these waves reaches the coast, it is high tide at that place; when the

trough between the waves reaches the coast, it is low tide. About twelve and a half hours intervene between one high tide and the next.

64. Unlike wind waves, the tidal waves cause powerful currents which extend to the very bottom of the sea.

In the open sea the tidal wave is low and imperceptible, but as it advances between the headlands of a coast, the approaching shores and the shallowing water force the wave to become much higher. At the heads of some narrowing bays it is as much as 50 or 60 feet

High and Rocky Coast, Maine.

high; on more open coasts heights of from 6 to 12 feet are usual.

High tide rushes rapidly up some estuaries and river mouths in the form of a breaker called a *bore*, which is dangerous to shipping.

65. Work of Waves and Tides. Waves dash upon the coast at times with great force. If the shore is high and rocky, fragments of loosened rock are picked up and hurled against the cliffs, thus loosening other fragments, and undermining and rapidly cutting back the front of the cliffs. The fragments, pounded against the cliffs, or rolled backward and forward upon one another, are worn away, first to pebbles and then to fine sand.

Much of the sand made in this way on rocky headlands is carried by tidal currents and by the wash of the waves into sheltered coves, or to straight stretches of low and gently sloping coast, where it is thrown upon the shore to form a smooth, sandy *beach*.

Thus the waves and tidal currents are constantly wearing back the rocky headlands, and building out the intervening coves — thus making the coast line more regular.

66. In some places great storm waves breaking at some distance from the shore, and depositing sand in the water, gradually build up a long, low island, or *barrier beach*, parallel with the shore. Between this beach and the mainland a *lagoon* of shallow water is inclosed. In other places, where opposing currents leave still water between them, sediment from both

Smooth and Sandy Beach, Maine.

currents is deposited, forming low, sandy *capes*, *spits*, or *sandy hooks* extending out from the shore.

67. **Coral Reefs and Islands.** Where the sea water is warm, clear, and not too deep, and where currents bring plenty of food, little animals called *coral polyps* live in great colonies attached to the sea bottom. When the animals die, their stony skeletons, composed of lime extracted from the water, remain, and to these skeletons other polyps of the same kind become attached. Thus by the growth and death of countless polyps the rocky base on which they grew may gradually be built up to the surface of the sea, forming a low island, or *coral reef*. A coral island often has the form of a ring of land, surrounding a shallow lagoon; it is then called an *atoll*.

Tests. Define and explain waves; breakers; tides; flood tide; high tide; ebb tide; low tide; a bore; a barrier beach; a sandy hook; a coral reef.

GREAT BARRIER CORAL REEF, AUSTRALIA.

THE ROCKY LAYERS OF THE LAND

68. **What becomes of the Rock Waste.** We have now learned that the weather and moving water and ice are constantly at work wearing away the land and carrying the rock waste down the slopes.

In time, much of this rock waste reaches the sea, where it is deposited as sediment. The heavier material (gravel and sand) sinks soonest and forms a layer of coarse sediment near the shore, while the finer particles are carried farther out before they too sink and form a layer of mud or clay.

Nearly all the rock waste brought down to the sea is deposited within a few hundred miles of the coast, and with it are mixed the bones of animals washed from the land, or of sea animals. Farther from land almost all the deposits are the shells of sea animals. Of these there are millions; and although most of them are very tiny, they make, in some regions, a thick layer of slime, or *ooze*, on the deep sea floor.

69. Continued additions make the deposits thicker each year, until the lower layers are pressed into stone. In these layers of sediment the forms of the shells and bones are frequently preserved as *fossils*. The sandy deposits near the shore become layers of sandstone; the deposits of mud and clay become layers of shale or soapstone; and the oozes become different kinds of limestone and chalk, which are often little more than masses of fossils.

70. By gradual upheaval these layers of hardened sediments on the sea bottom become land, and by the pressure and heat produced in the upheaval they may be hardened, crystallized, and changed still further — limestone becoming marble; sandstone, quartzite; and shale, slate. Some of the more deeply buried layers may even be melted and changed to granite or to lava. In this way have been formed nearly all the rocky layers of the land.

71. **Peat and Coal.** In some places simple forms of plants grow thickly on the surface of fresh water near the shores of shallow ponds and lakes. They may in time cover the entire surface of the water with a floating mat of vegetation, and this, growing on top but dying beneath, may eventually fill the lake with a dark mudlike mass called *muck* or *peat*, the whole forming a peat swamp, or *bog*. When thoroughly dried, peat may be used for fuel.

Thousands of years ago great swamps, somewhat like the present peat bogs, but containing a vastly more luxuriant vegetation, existed in many lowlands. After their formation they were depressed below the sea and were covered by layers of mud and sand. The sediment gradually hardened to layers of rock, and the peat to beds of the black stonelike substance which we call *coal*. In the later upheaval of these beds some of them were further changed into *hard* or *anthracite* coal.

FOSSILIFEROUS LIMESTONE.

72. **Petroleum and Natural Gas.** Vegetable or animal matter which ages ago was deeply buried under sediments, has sometimes been gradually changed, not into coal, but into *rock oil*, or *petroleum*, and into *natural gas*. Both of these substances, like coal, make good fuel. They are obtained by boring deep wells through the overlying layers of rock.

Tests. How does the ocean deposit near the shore differ from the deep sea deposit? Explain the formation of sandstone; shale; limestone. Of peat; coal. Of petroleum; natural gas.

Supplemental Work. Bring to school specimens of several kinds of rock and of several kinds of coal. Label each specimen, and keep the collection in the schoolroom.

Read pp. 211–214 in "Carpenter's Geographical Reader, North America."

TOPICS ON WEARING AWAY OF THE LAND

I. Erosion. Definition. Work of wind. Ground water: source; uses; erosive work. Streams: source; deepening work; broadening work. Glaciers: source; motion; erosive work. Work of waves.

II. Transportation. Wind. Water. Ice. Direction.

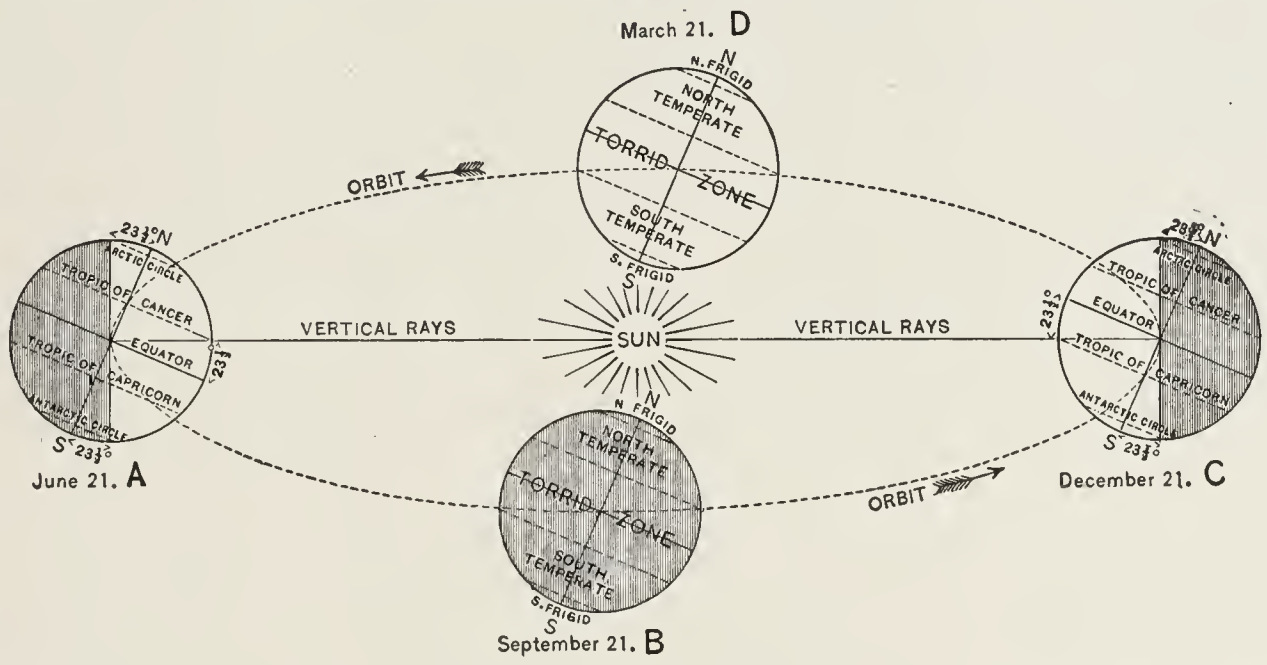
III. Deposits. Dunes. Stream deposits: sand bars; flood plains; deltas. Spring deposits. Glacial drift. Shore deposits: beaches; sandy hooks; coral reefs. The layers of rocks of mineral origin; of animal or vegetable origin.

IV. Features of Surface Waters. Springs: origin; classes; uses. Streams: source; divides; flood plains; falls (cataracts); meanders; bayous; mouths. Lakes: origin; inlets; outlets; classes. Glaciers: regions; classes.

REVOLUTION OF THE EARTH

73. Revolution. The earth, in addition to the rotation on its axis once every twenty-four hours, has another motion, called *revolution*, which carries it around the sun in a nearly circular path, or *orbit*. The time required by the earth to revolve completely around the sun is called a *year*.

74. Inclination of the Axis. As the earth revolves, the axis always points in nearly the same direction (toward the North Star, p. 6). The axis is not perpendicular to the orbit; it leans, or inclines, about $23\frac{1}{2}°$ from the perpendicular, as shown in the diagram.



75. The Seasons. When, in June, the earth is at the point in the orbit represented at *A* in the diagram, it is seen that, owing to the inclination of the axis, the north pole lies $23\frac{1}{2}°$ within the lighted half of the earth, while the south pole lies $23\frac{1}{2}°$ within the dark side; and that the northern hemisphere receives more of the sun's rays than the southern hemisphere receives. Hence the northern hemisphere must then be warmer than the southern, and we say the season of *summer* prevails in the northern hemisphere, but *winter* prevails in the southern hemisphere.

Six months later, in December, when the earth reaches the position *C* in the orbit, it will be seen that the north pole is then in the dark half, and the south pole in the lighted half of the earth. The southern hemisphere then receives the most heat, and has its summer while the northern hemisphere has winter.

In March or September, when the earth is at *D* or *B*, the sun's rays reach both poles, and the northern and southern hemispheres each receive the same amount of sunshine. Each hemisphere is then cooler than in summer, but warmer than in winter. It is then the season of *spring* on one side of the equator, and the season of *autumn*, or *fall*, on the other side.

76. Varying Lengths of Days and Nights. The points *B* and *D* in the orbit are called *equinoxes* (equal nights); for when, in September and March, the earth is at these points, the ends of the axis are on the line which divides the light half from the dark half of the earth, and rotation in this position produces days and nights of equal length all over the earth.

At all other points in the orbit the days and nights are unequal in length (except on the equator), the inequality being greatest in June and December, when the earth is at the points *A* and *C* (called *solstices*). At these times the days and nights are still equal in length on the equator, but unequal elsewhere, the inequality increasing rapidly as one advances from the equator toward either pole. Thus in the hemisphere having summer, the days are 14 hours long (nights 10) in latitude 31°; 16 hours long in latitude 49°; 20 hours long in latitude 63°; and on the parallel $23\frac{1}{2}°$ from the pole there is continuous daylight for 24 hours. Still nearer the pole continuous daylight lasts longer and longer, and at the pole it lasts for six months.

In the hemisphere having winter, the conditions are just reversed; the nights are longer than the days, and near the pole the sun does not rise at all for weeks or months.

77. Tropics and Polar Circles. When the earth is at *B* or *D*, the sun is directly (vertically) overhead at the equator, and its rays just reach both poles. When the earth is at *A* or *C*, however, the sun's rays extend $23\frac{1}{2}°$ beyond one pole and fall short of the other pole by $23\frac{1}{2}°$, while the vertical rays fall on places $23\frac{1}{2}°$ north or south of the equator. Special names are given to the parallels reached by these rays of the sun at these times. The parallels $23\frac{1}{2}°$ north and south of the equator are called *tropics*. The northern one is the *Tropic of Cancer*, and the southern, the *Tropic of Capricorn*. The parallels $23\frac{1}{2}°$ from the poles are called *polar circles:* the northern, the *Arctic Circle*, and the southern, the *Antarctic Circle*.

78. Astronomical Zones. The tropics and polar circles divide the earth's surface into five *astronomical zones*, — a *torrid* zone, two *frigid* zones and two *temperate* zones.

The *torrid zone* lies between the tropics. It includes all parts of the earth on which the sun's rays are ever vertical. It is thus warmer, as a whole, than the other

zones. Half the zone is always in sunlight, and the days and nights are always of nearly equal length. No part of the year is either much warmer or much cooler than any other part.

Two *frigid zones*, one about either pole, are inclosed by the polar circles. These zones include all parts of the earth where, during the year, continuous daylight or continuous darkness lasts for 24 hours or more. They are the coldest of the zones, for in summer the sun never rises high above the horizon, and during much of the winter it does not rise at all.

A *temperate zone* lies between the torrid zone and each frigid zone. In the temperate zones there is a period of daylight and a period of darkness every 24 hours, but the noticeably long days in summer and long nights in winter cause warm summers and cold winters.

Tests. Define the earth's revolution; the orbit; the inclination of the axis. Explain the cause of the seasons; of the varying length of days and nights. How are the astronomical zones determined and characterized?

Supplemental Work. By means of a lamp and a globe or a ball, illustrate the position of the earth at the equinoxes; on June 21; on December 21.

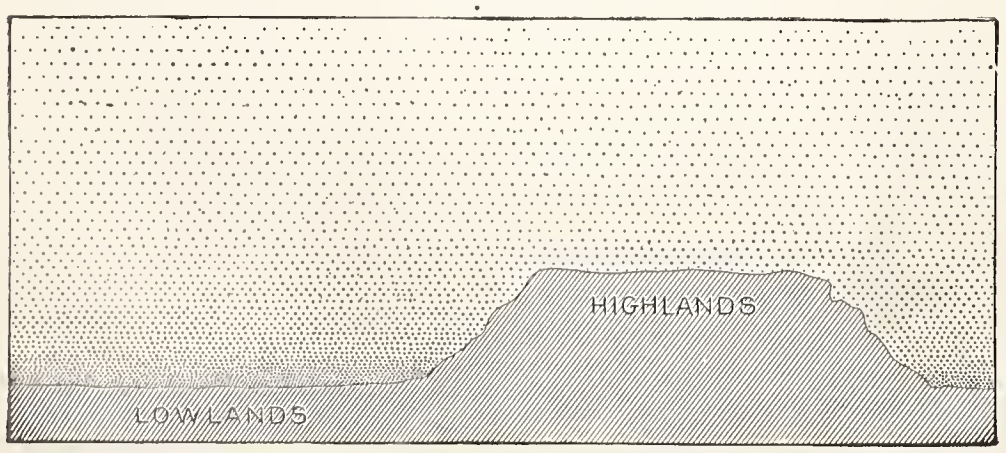
Read chapter 18 in "Carpenter's Geographical Reader, Europe."

THE TEMPERATURE ZONES

79. Temperature Zones. The true heat belts, or *temperature zones*, are not fixed and regular like the astronomical zones. They shift northward and southward with the changing seasons. Moreover, they have quite irregular boundaries. This is caused chiefly (1) by the irregular distribution of land and water over the earth, and (2) by the differences in elevation of the land.

80. When exposed to the sun's heat, land becomes warm much quicker than water does; and when warm it cools quicker than water. Hence in latitudes where the summers and winters are well marked, the land becomes warmer in summer and colder in winter than the sea in the same latitude.

81. The great body of air which surrounds the earth and extends upward to an unknown distance from its surface, is called the *atmosphere*. The upper part of the atmosphere, resting on the part beneath, compresses it and makes it *denser*. Therefore the atmosphere is densest at the surface of the sea; but on high mountain tops it is so thin, or *rare*, that it is but slightly warmed by the sun in the daytime, while at night it permits the heat of the sun-warmed ground to escape. The air on the lowlands, however, is so dense that it is warmed by the sun in the daytime, and also helps to keep the ground warm at night. It thus happens that the prevailing weather, or *climate*, of lowlands is warmer than that of highlands. Thus even near the equator, where snow is unknown in the lowlands, the tops of high mountains bear snow banks that are never entirely melted away.



ILLUSTRATING COMPARATIVE DENSITY OF THE AIR.

But it must not be supposed that a person living on the top of a mountain would be always cold. For the very reason that the thin air can not take much heat from the sun's rays, the sunshine itself is hotter than on lowlands; but at night, or in the shade, the weather is cold.

82. Boundaries of the Heat Belts. The heat belts in July (when they are farthest north) and in January (when they are farthest south) are shown on the opposite maps. Each boundary line is an *isotherm;* that is, a line passing through places having the same temperature. The boundary of the cold belt has about the temperature of freezing water (30°); that of the hot belt has the comfortable temperature of a sitting room (70°).

In July, when the sun rises high over the northern hemisphere, and the summer days are long, the heat in the great land masses of North America and Eurasia is so great that the *heat equator* (line of greatest heat) and the hot belt extend far north of the tropic. It will be noticed also that at this season the heat equator lies but little north of the true equator over the cooler oceans, and that the temperate belt extends to the north pole. As July is in the winter of the southern hemisphere, the hot belt does not extend to the tropic in that hemisphere, nor the temperate belt to the polar circle. As the surface of the southern hemisphere is mostly water, the boundaries of its heat belts are comparatively regular.

Compare the January positions of the heat equator and the heat belts with their July positions. Explain the differences in position.

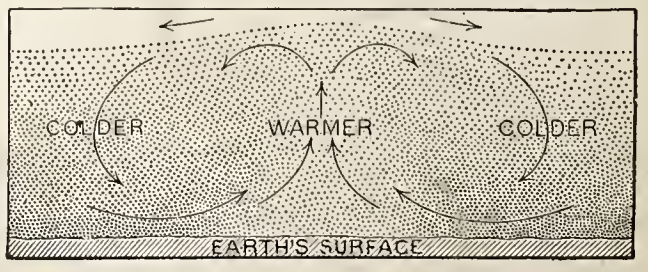
In the lowest pair of maps the boundaries of the heat belts in both January and July are drawn, in order to show the temperature changes of each region during the whole year. It thus appears that different parts of the earth have well-defined temperature conditions. Certain regions are always hot; other parts have a temperate winter and a hot summer; others again are always temperate. Some regions have a temperate summer and a cold winter; some have a hot summer and a cold winter; and in some the weather is always cold.

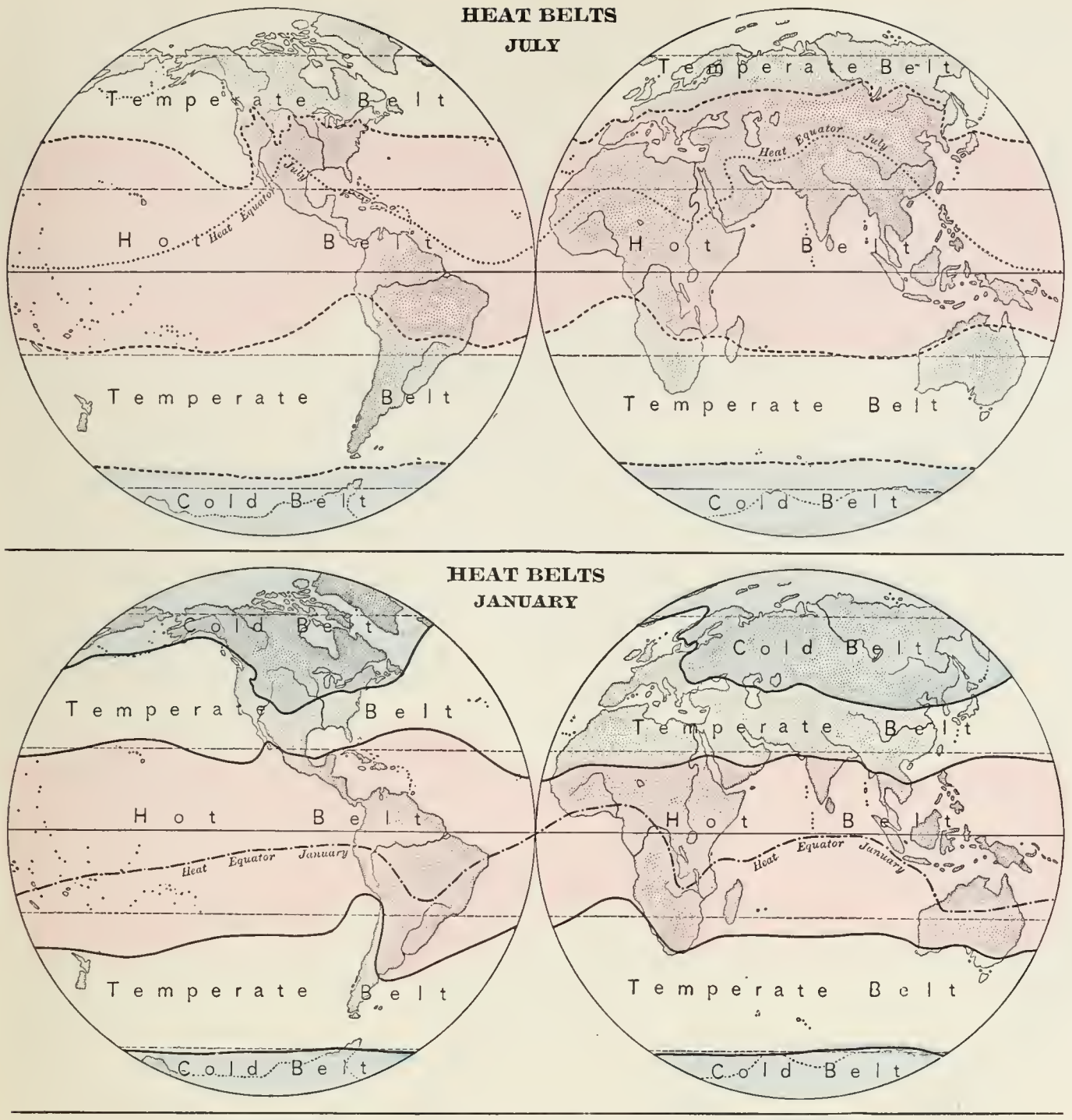
Tests. Define rare; dense; isotherm. How do the true heat belts differ from the astronomical zones, and why?

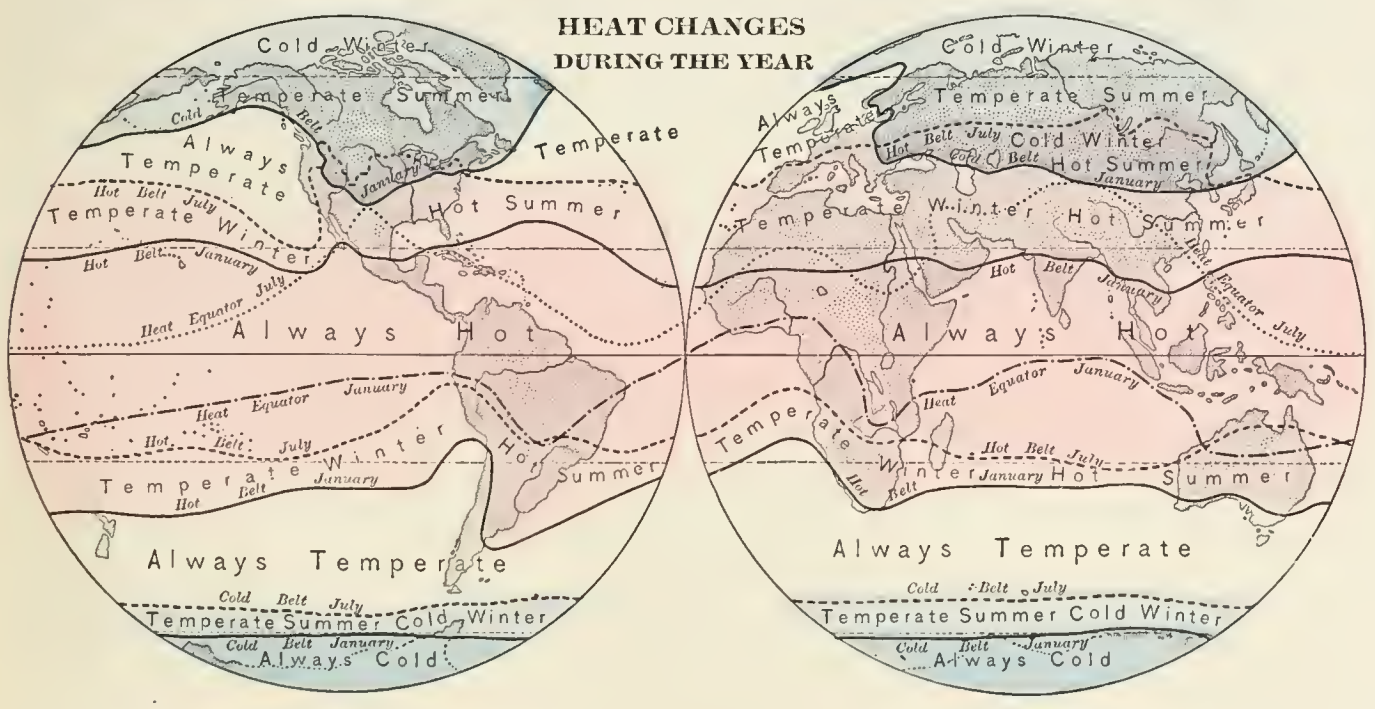
Supplemental Work. Draw maps of the hemispheres, showing the tropics, polar circles, and true heat belts in July and in January.

WINDS

83. Cause of Winds. When air is heated, it expands and becomes lighter, bulk for bulk, than cooler air. This helps to explain why the smoke from a fire *rises*. The heat expands the air over the fire and makes it lighter than an equal bulk of the cooler surrounding air. The cooler and heavier air, therefore, flows in below and pushes the lighter air upward, but is quickly warmed and is







itself pushed upward by the following cooler and heavier air. Thus over the fire there results an ascending current of air which carries the smoke upward. The rising current of warm air is fed below by currents of cooler air from the sides, while the ascending air gradually cools and spreads out above; the general movement being as indicated in the diagram.

When from any cause the air over a region becomes warmer than that over the surrounding regions, an ascending current is formed much like that over a fire. The surface currents of cooler and heavier air are called *winds*.

84. Trade Winds. Near the heat equator the air is always warmer and lighter than the air nearer the poles; hence there are nearly constant winds blowing toward the heat equator from some distance on both sides. These winds are called *trade winds*. They are gentle winds, which over the level surface of the open ocean blow steadily throughout the year in nearly the same direction. Over the uneven surface of the land they are not so steady.

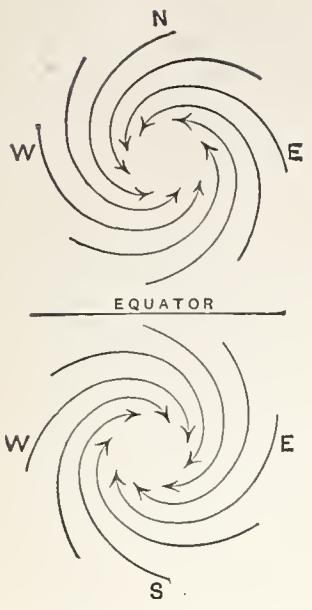
Because of the rotation of the earth, moving air turns out of a straight course as it advances, turning to the right north of the equator, but to the left south of the equator. The trade winds, therefore, approach the heat equator from the northeast in the northern hemisphere, and from the southeast in the southern.

85. Belts of Calms. The northeast and southeast trade winds, when they meet, are forced slowly upward by the cooler and heavier air behind. The place of meeting is therefore marked by a narrow region of light, fiftul breezes or of calms, called the belt of *equatorial calms*.

At the outer edge of the trade winds, in both the northern and the southern hemisphere, is a narrow belt of *tropical calms* in which the air is slowly settling down from the upper atmosphere.

86. Prevailing Westerly Winds. Beyond the tropical calms the general movement of the atmosphere is toward the poles—from the southwest in the northern hemisphere, and from the northwest in the southern hemisphere.

The winds of these regions, though most frequently from a westerly quarter, are unlike the trade winds in being exceedingly variable in direction. They frequently form into vast whirls, which are called *cyclones*, in the center of which the air is rising. Cyclones are often hundreds of miles in diameter. They move eastward with the general drift of the atmosphere, often for great distances, before dying out. Nearly all the ordinary storms in the temperate zones are cyclones.

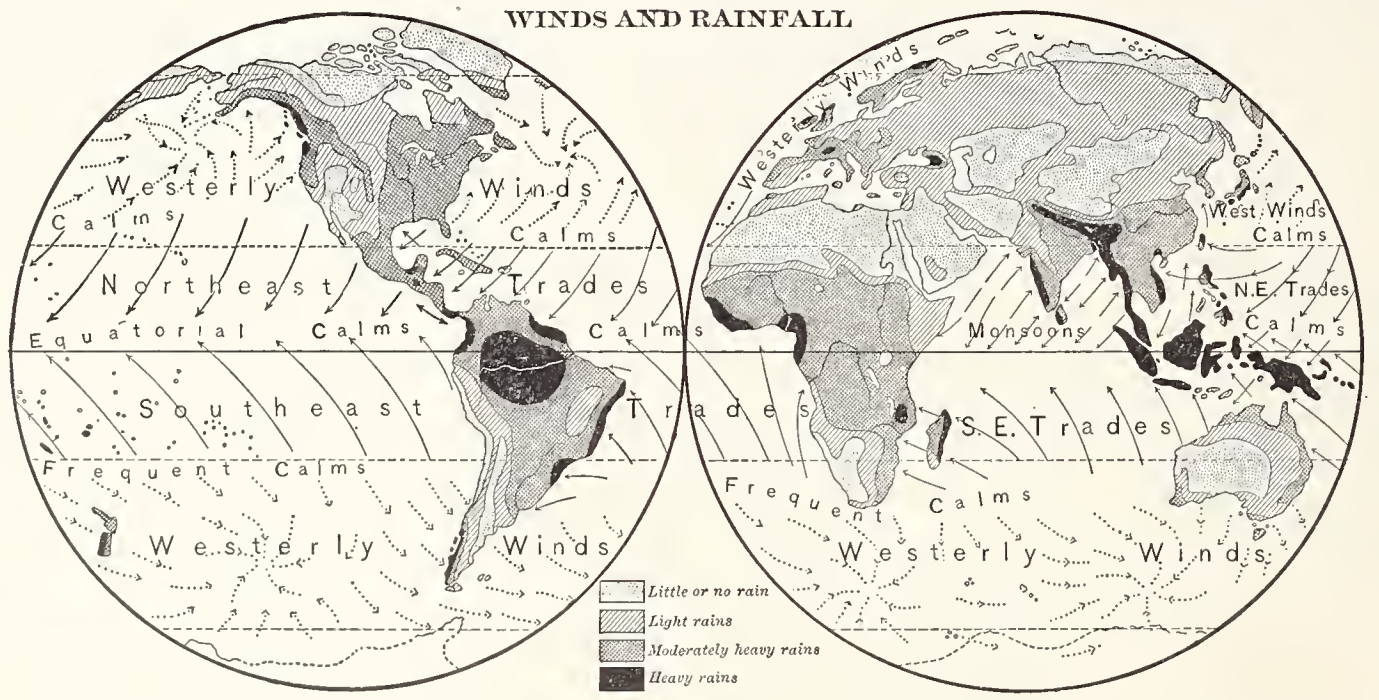


Because of the earth's rotation, cyclones on the same side of the equator always whirl in the one direction, but on the other side of the equator they whirl in the opposite direction, as shown in the diagram.

In the belt of prevailing westerly winds the land is warmer or cooler than the sea, according to the season. Hence these winds reach the west coasts of the continents as warm winds in winter, but as cool winds in summer. For this reason the west coasts of North America and Eurasia in this belt have warmer winters and cooler summers than the east coasts.

87. **Monsoon Winds.** The maps on p. 21 indicate that the heat equator shifts far northward and southward during the year. The equatorial calm belt shifts with it, but not so far. Still there are parts of the torrid zone which lie far south of these calms in July, but north of them in January. As the winds blow obliquely toward these calms, it follows that in these parts of the torrid zone the winds blow from one direction in summer and from another in winter. This is very noticeable on the northern Indian Ocean and its coasts, where the seasonal winds are called *monsoons*, from a word meaning "season." In these regions the regular northeast trades prevail in winter, while in summer a monsoon wind blows from the southwest, south, or southeast.

Tests. Explain the cause of winds. Define and describe the trade winds; the calm belts; the prevailing westerlies; cyclones; monsoons.



RAINFALL

88. **Moisture in the Air.** From every moist surface, but mostly from the extensive surface of the sea, water is nearly always evaporating, or rising into the atmosphere in the form of invisible *vapor* (§ 47). More water usually evaporates when the water and air are warm, than when they are cold. The vapor, mingled with the air, is carried about by the winds, and thus much of that from the sea is brought over the land. When water evaporates, its impurities are left behind; thus although the water of the sea is salt, the vapor from it is fresh and pure.

89. **Clouds, Rain, and Snow.** When vapor-laden air is chilled, part of its invisible vapor condenses into countless tiny water drops or ice crystals, forming a *fog* or a *cloud*. If the vapor is chilled by coming into contact with cold vegetation, we find on the foliage drops of *dew*, or ice crystals of *hoarfrost*. If the air about a cloud grows warmer, the tiny cloud drops or crystals may evaporate and disappear, but if it continues cool, they may unite into larger drops and fall to the earth as *rain*, or into flakes which may fall as *snow*.

Thus cloud, rain, and snow are formed by the *chilling* of the invisible vapor in the air. The vapor may be chilled either by rising higher in the atmosphere, or by being carried by the winds northward or southward into cooler latitudes.

90. **Rainfall of the Torrid Zone.** As the trade winds advance over the oceans they grow warmer, and are nearly filled with vapor when they reach the equatorial calms. Here the air rises; its vapor is chilled, and condenses into the clouds and the heavy daily rains for which the equatorial calms are noted. Over the Atlantic and Pacific oceans this rainy calm belt remains near the equator; but over the continents it shifts north and south with the seasons through nearly the entire width of the torrid zone, and, as it passes, it gives a period of ample rains to the greater part of the land surface in that zone. In the southern part of the zone the rainy season occurs in the January half of the year; but in the northern part, in the July half. In the central parts of the zone there are apt to be two rainy seasons in the year — one when the rain belt sweeps northward in our spring, and another as it sweeps southward in our fall.

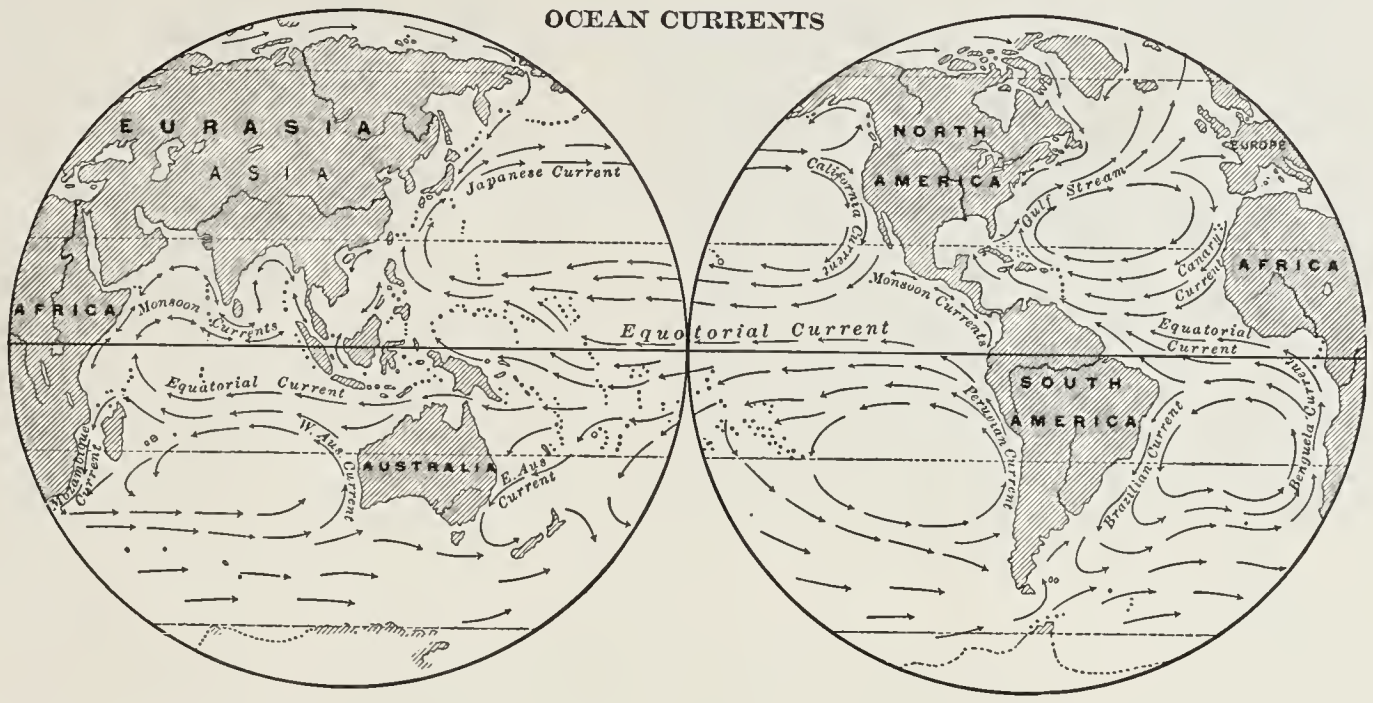
91. Where vapor-bearing winds, either in the torrid zone or elsewhere, are forced to rise over highlands, the vapor is chilled, and rainfall results on the windward side of the highland, while the region beyond the highland may receive but little rain.

92. **Rainfall of the Temperate Zones.** The prevailing winds of the temperate zones blow toward colder latitudes. They start from the tropical calms as dry winds, and as they cool quite slowly they do not yield much rain until they are chilled either by rising in cyclones (§ 86) or by rising over highlands. Thus highlands and cyclones are the rain producers of the temperate zones. The temperate zones in general have less rainfall than the torrid zone.

93. Rainless Regions. Near the tropics in each of the grand divisions are regions in which there is little or no rain. Most of these lie for part of the year in the belt of tropical calms, where the air is descending and growing warmer, and hence its vapor is not condensed into clouds and rain. During the rest of the year highlands to windward rob the wind of its moisture before it reaches these regions (§ 91).

Compare the maps on pp. 21 and 22 and see if you can explain the general distribution of rainfall on the land surface.

Tests. Explain clouds; rain and snow. Explain the general distribution of rainfall in the torrid zone; in the temperate zones. Give effects of highlands on rain distribution.



OCEAN CURRENTS

94. Cause. In nearly all parts of the sea there are slow movements, or *currents*, of the surface water. The currents move in the general directions of the prevailing winds, and are believed to be caused chiefly by them.

95. General Circulation. The trade winds drive the equatorial waters of all the oceans westward against the continents, where the currents turn north and south into the regions of the prevailing westerly winds. In these latitudes the currents are driven eastward across the ocean, and then a part of their water is turned toward the equator and completes the circuit, as shown on the map. Thus on each side of the equator, in both the Atlantic and the Pacific ocean, the water is thrown into a great whirl or eddy around the region of tropical calms.

A branch of the north Atlantic eddy follows the coast of Europe into the Arctic Ocean and sweeps around its basin, returning southward near Greenland.

In the Indian Ocean, there is a great eddy south of the equator, similar to those in the south Atlantic and Pacific oceans; but north of the equator the currents of the Indian Ocean move generally eastward during half of the year, and generally westward during the other half, changing as the monsoon winds change their direction.

96. Temperature. Wherever the ocean eddies move *from* the equator, their water is warmer than that of the surrounding ocean, and that part of the whirl is called a *warm* current; but that part of the whirl which moves *toward* the equator is a *cold* current, because it is cooler than the surrounding water.

Currents affect the climate of the neighboring coasts chiefly by warming or cooling the winds which blow from them to the coasts. Warm currents keep the shores against which they flow free from ice.

97. Names of Currents. Various parts of these great surface eddies of the oceans have special names, which are printed on the map below. What is the part of each great eddy called which moves west near the equator? What is the name of the north Atlantic current north of the West Indies? This is so called because part of it appears to flow out of the Gulf of Mexico between Florida and Cuba (p. 36). The narrowness of this channel makes the Gulf Stream here one of the most rapid of the ocean currents. Is it a warm or a cold current? What is the corresponding part of the north Pacific eddy flowing past the Japanese Islands called? Its Japanese name is *Kuroshiwo*, or "Black Stream." Is it a warm or a cold current? What is the eastern part of the whirl in the north Pacific called? the eastern part of the south Pacific whirl? Are these warm or cool currents?

Tests. Name, describe, and explain the chief currents of the Atlantic Ocean; the Pacific; the Indian; the Arctic. Explain the effect of ocean currents upon climate.

Supplemental Work. Using the maps on p. 21, write a comparison of the climates of the eastern and western shores of the northern Pacific.

TOPICS ON DISTRIBUTION OF HEAT AND MOISTURE

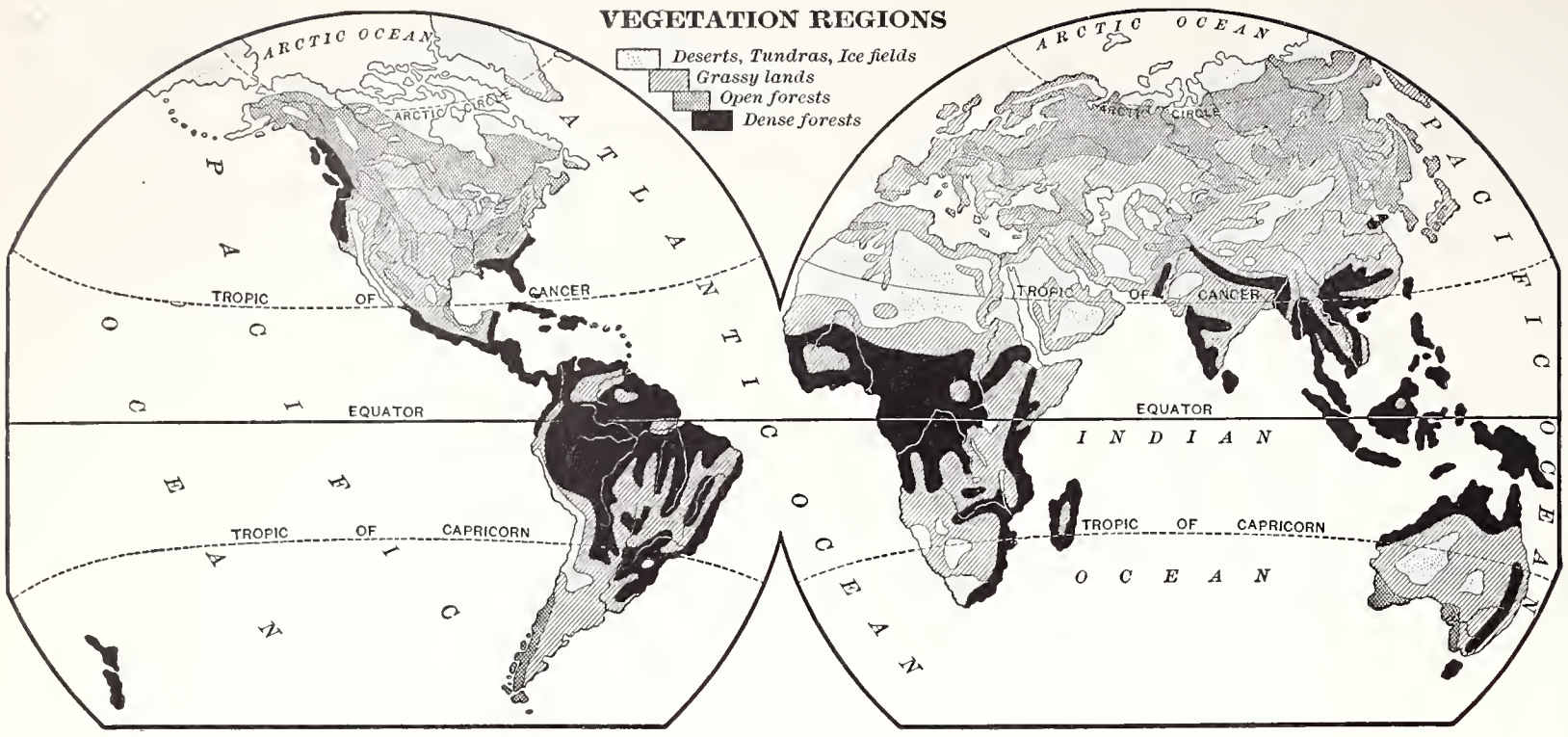
I. HEAT. Day and night: cause; differences in length. Seasons: causes; names; times. Astronomical zones: boundaries; names. Heat belts; how and why they differ from the zones.

II. RAIN. Cause. Influence of winds: trade winds; prevailing westerlies; calms — equatorial, tropical; cyclones; monsoons. Influence of seasons. Effect of mountains.

PLANTS AND ANIMALS

98. General Distribution. Plants and animals are found in nearly all parts of the world, but they are most abundant in warm, moist equatorial lowlands. From these regions there is an irregular but gradual decrease in life forms toward the cold polar regions, and also toward the cold summits of high mountain ranges. The map on p. 24 shows the great vegetation regions.

99. Forests. In equatorial regions where the rainfall is abundant, forest vegetation is wonderfully dense



and luxuriant. The great trees stand close together, and are often covered and interlaced with hundreds of climbing vines and air plants. As there is no cold season, vegetation grows throughout the year and is always green.

In the temperate zones, with less heat and rainfall, the forest vegetation is less dense and luxuriant than that in the torrid zone. Only those plants whose fruit ripens during the warm season can live in the temperate zones. In the cold season they stop growing or die. The animals of these zones grow heavier coats of hair, fur, or feathers in winter than in summer. Some of them lie dormant or asleep in sheltered places throughout the cold season.

Dense Forest.

100. Grassy Lands. In both torrid and temperate zones where the rainfall is too light or too unevenly distributed through the year for the growth of forests, it may yet be sufficient for a growth of grass, shrubs, and other low plants. In such places are found open grassy lands. These are called *prairies*, *steppes*, *llanos*, and *pampas*, in different parts of the world.

101. Tundras. In the frigid zones it is so cold that few kinds of plants and animals can live. The soil is frozen to a great depth; only the surface thaws, even in midsummer. When the thaw occurs, a wide strip of country along the Arctic coast of America and Eurasia is converted into great swamps, called *tundras*.

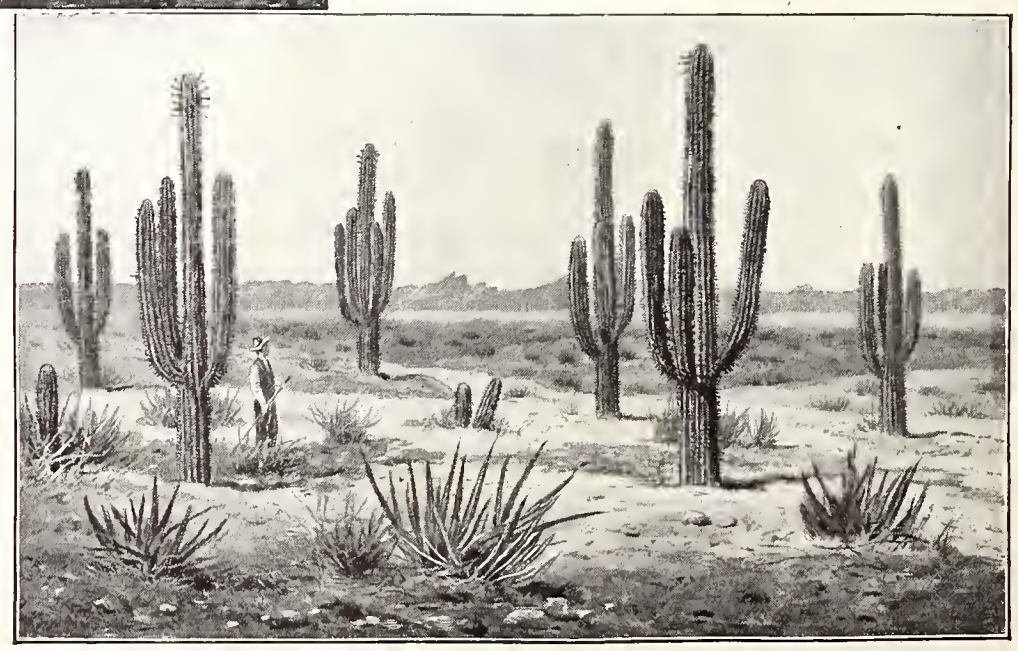
Though some kinds of flowering plants are occasionally found in the frigid zones, the vegetation consists chiefly of mosses and lichens and a few dwarfed trees. Most of the animals have coats of thick fur or coverings of fat to keep them warm.

102. Deserts. A very dry region, even if it is warm, can have little or no vegetation. Such a region is a *desert*. Compare the rainless regions, on the rain map, with the deserts on the vegetation map.

The few plants of deserts are peculiarly adapted for a dry climate, having hard, close bark and small leaves through which their juices can not evaporate easily. Many, like the cactus, are armed with thorns which prevent animals from breaking the sap-preserving bark.

103. Barriers. Animals are free to roam, birds to fly, and the seeds of plants are scattered far and wide by winds, currents, and animals; yet, sooner or later, both animals and seeds are likely to reach a region in which they are unfitted to live, and which thus acts as a natural *barrier* to their further diffusion.

104. Great Life Regions. The oceans which separate the continents, and the vast deserts, and very lofty mountain ranges are important barriers to the spread of animals and plants. They mark the division of the continental lands into the six great life regions shown on the map opposite. Each of these regions has many kinds of plants and



The Giant Cactus.

animals not found elsewhere, although different regions also have some kinds in common.

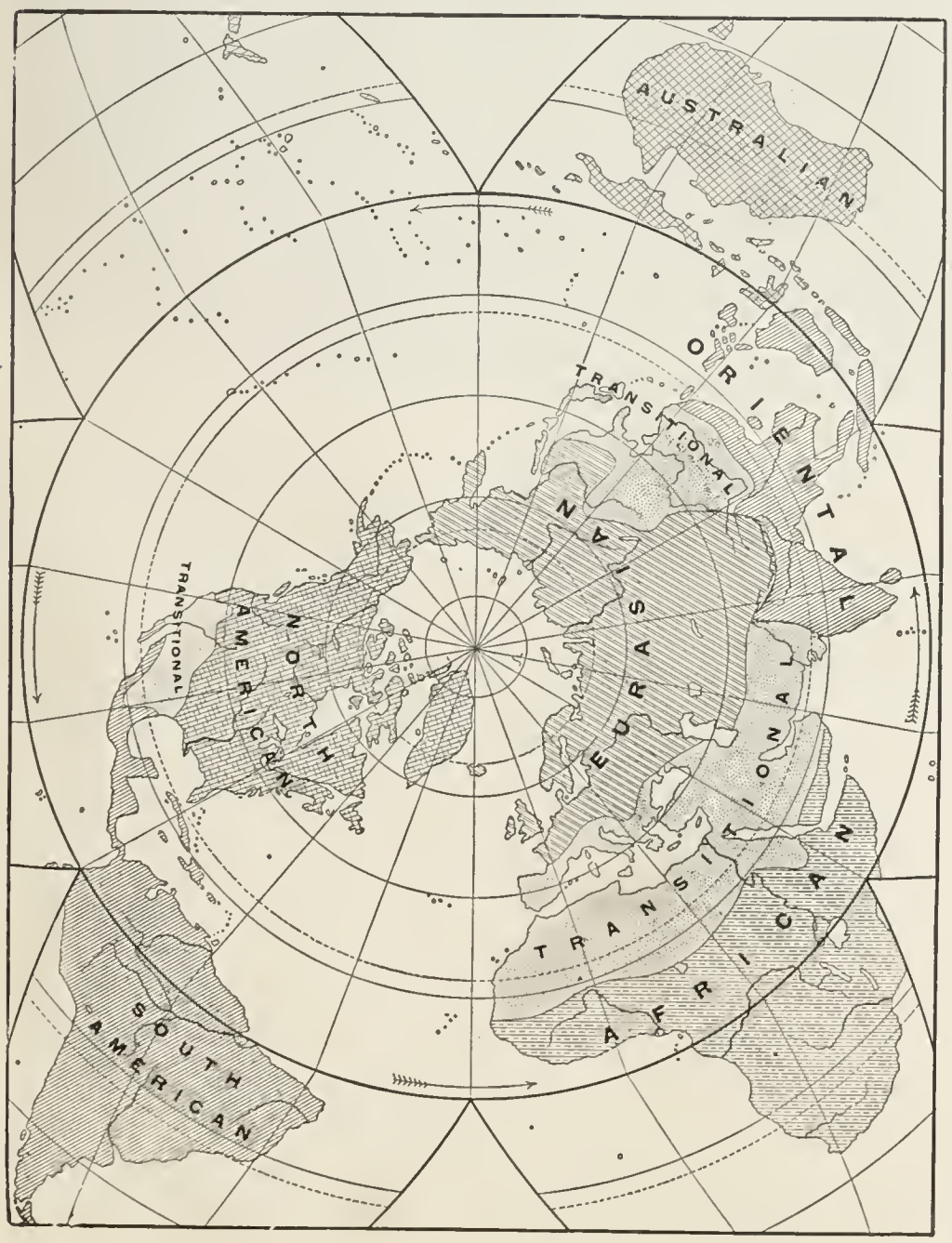
In the several transitional areas are found life forms resembling some of those in the neighboring regions, but strangely changed and adapted to fit them to their dry surroundings.

Supplemental Work. Read "How Plants Travel" in Johonnot's "Glimpses of the Animate World"; "Migration of Birds" in Lockwood's "Animal Memoirs," Part II.; Dana's "Plants and their Children."

THE AUSTRALIAN AND SOUTH AMERICAN REGIONS

105. The Australian Region is the most peculiar of the life regions. Nearly all of the native four-footed animals either are hatched from eggs or are so helpless at birth that for some time they are carried in a pouch or fold of skin on the breast of the mother.

There are many kinds of such pouched animals: many are of the kangaroo type; some are like small bears, as the koala, which is about the size of a poodle dog; still others are somewhat like squirrels, rabbits, rats, mice, or moles in size and habits. The kangaroos have short, weak fore legs and long, stout hind legs, upon which they squat upright and with which they leap over



LIFE REGIONS.

SOME ANIMALS OF THE AUSTRALIAN REGION.

the ground. The largest kangaroo, when sitting upright, is as tall as a man, but some kinds are as small as rats.

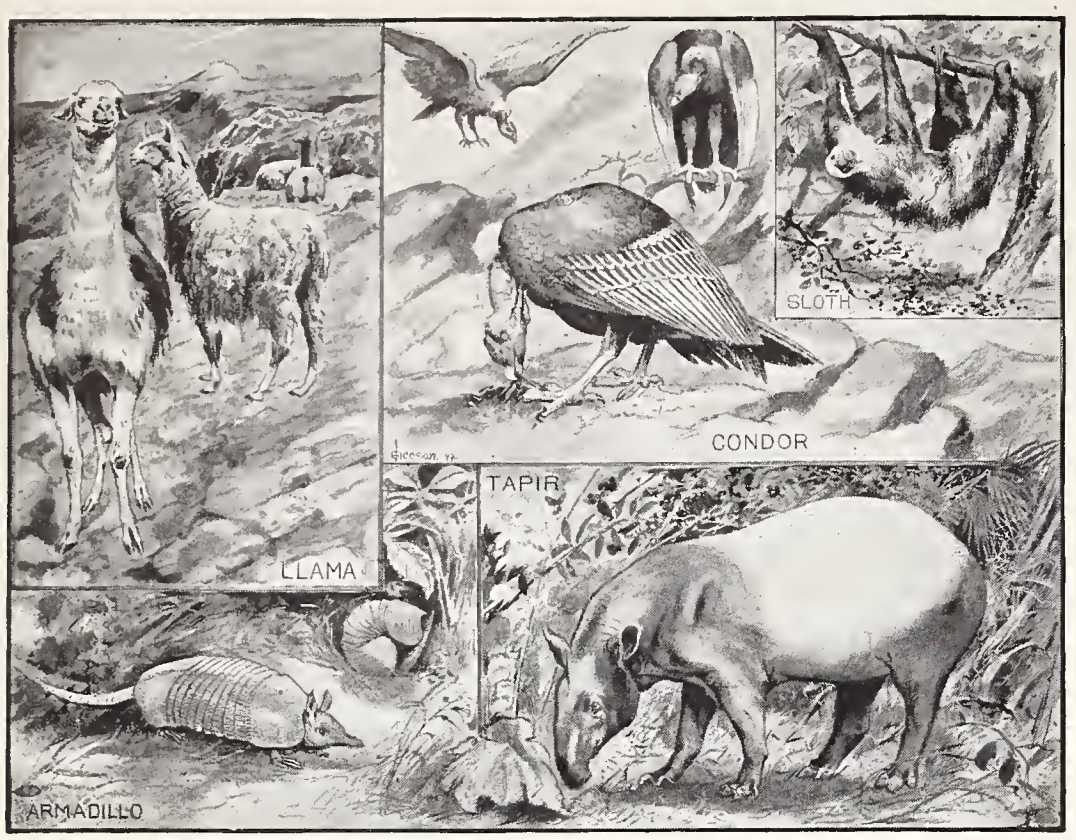
The other animals are almost equally peculiar, including the duckbill, which lays eggs, has a bill like a duck's, four webbed feet, and fur like a mole's; large running birds, as the emu, cassowary, and kiwi; and bower birds, which build covered playgrounds or bowers, and decorate them with shells or colored stones.

Among the more peculiar plants are the leafless oak, and flowering but leafless acacia trees. Still more interesting are the eucalyptus trees, some of which are among the tallest trees in the world. On many Australian trees the leaves grow with their edges toward the sun.

During the last century white men have carried to Australia sheep, cattle, rabbits, and other kinds of animals. These have multiplied wonderfully, showing that other than pouched animals might have lived in this region had not some barrier prevented them from reaching it. The fact that the native animals and plants of Australia are so very peculiar is thought to indicate that Australia has been separated from Eurasia ever since a very early period in the world's history.

106. The South American Region has a greater variety of life forms than any other region, and, next to the Australian, is the most peculiar. It is the home of many kinds of opossums, which are pouched animals, like those of Australia.

Other peculiar animals are the sloth, which spends most of its life hanging by its long curved claws from the branch of a tree; the ant-eater, which obtains its food by thrusting its long, sticky tongue into an ants' nest; and the armadillo, which is covered with a flexible horny armor. This region is the home of the guinea pig, the tapir, the long-tailed monkey, the piglike peccary, and the jaguar, or American tiger. Several kinds of llamas live in the western highland and the southern lowlands.



Some Animals of the South American Region.

Among the birds are beautiful parrots, the condor,— the largest of flying birds,— and the ostrich-like rhea.

The plants include mahogany, rosewood, logwood, and cinchona or Peruvian-bark trees; plants yielding India rubber, the vanilla bean, and useful gums. Cayenne pepper, the potato, the tomato, tobacco, and Indian corn are native in this region, but the coffee tree, sugar cane, and wheat were carried to South America by man.

The difference in life forms between South America and North America indicates that these two grand divisions have not always been connected with each other.

Supplemental Work. Bring to school a picture or a description of one Australian and one South American plant or animal.

Read chapter 6 in "Carpenter's Geographical Reader, Australia," and pp. 75–76, 92–94, 140–142, 199, 239–241, 243–244, 320–324, "Carpenter's South America."

THE AFRICAN AND ORIENTAL REGIONS

107. The African Region is specially noted for the great number of its flesh-eating animals — lions, leopards, panthers, hyenas, and jackals — and for its hoofed animals, such as the antelope, Cape buffalo, hippopotamus, giraffe, zebra, and wild ass, from which the donkey is descended.

Here also are the elephant, the rhinoceros, and many monkeys, including the huge, manlike gorilla and the smaller chimpanzee. The most interesting bird is the ostrich.

The plants include many palms, among them the oil palm and the date palm, and many acacias, most of them yielding valuable gums, such as gum arabic. The coffee tree is a native of northeastern Africa.

108. The Oriental Region is noted even more than the African for flesh-eating animals; for besides the lion, leopard, and hyena, it has the tiger, the largest, strongest, and fiercest of the cat family. Like the African, too, this region has the elephant, rhinoceros, and buffalo. Elephants and buffaloes are domesticated. Another domestic animal, the zebu, is much like our domestic cattle, but has a hump over its shoulders.

Here are also found bears, several kinds of deer, wild swine, tapirs, mice, squirrels, and several kinds of monkeys, including the orang-outang.

Among the birds are the peacock and the jungle fowl, from which our chickens are descended.

In the hot lowland forests are many bamboos, palms, spice-yielding plants, and fine hard woods, such as teak, ebony, satinwood, and sandalwood.

The similarity of the life forms of Africa to those of the Oriental and Eurasian regions indicates that these regions have been connected as closely as at present for a very long time.

Supplemental Work. Bring to school a picture or a description of one animal and one plant belonging to each of these regions.

Read chapters 22, 23, and 33 in "Carpenter's Geographical Reader, Africa"; and chapter 27 in "Carpenter's Asia."

Some Animals of the African Region.

THE EURASIAN AND NORTH AMERICAN REGIONS

109. The Eurasian and North American Regions differ from each other less than any other two. Their plants and animals are so similar that it is believed the present barriers between the grand divisions in the Arctic region can not have existed very long. Yet the native life forms of the two regions are seldom exactly alike, and in some instances they are quite different.

In both regions are found bears, wild cats, wolves, foxes, deer, beavers, and squirrels. The white polar bear and the black bear are the same in the two regions, and the fierce grizzly bear is much like the European brown bear. The reindeer that is trained to draw sledges over the Arctic snows of Eurasia is practically the same as the wild caribou of northern North America. The European elk is the same as the American moose. The Rocky Mountain goat and the bighorn sheep are related to the many kinds of wild goats and sheep, including the ibex and chamois, of Eurasia; even the

American bison (buffalo) and musk ox are close kin to wild cattle found in Eurasia.

The puma, or American panther, skunk, raccoon, prong-horned antelope, muskrat, prairie dog, otter, and opossum are found only in America, while wild boars, camels, and wild horses are found only in Eurasia. The horse was brought to America by man.

Eagles, owls, hawks, and crows are found in both regions. Wild turkeys, buzzards, blue jays, orioles, mocking birds, and humming birds are American. Vultures, pheasants, magpies, and nightingales are peculiar to Eurasia.

Cone-bearing trees, as the pines, spruces, firs, hemlocks, and cedars, are found in both regions, as well as the oak, chestnut, beech, ash, elm, sycamore, walnut, maple, birch, and willow. But golden rod, asters, bald cypress, and redwood are found only in America; while the olive and almond are natives of Eurasia.

Some Animals of the Eurasian and North American Regions.

Some Animals of the Oriental Region.

110. Domestic Animals and Cultivated Plants are descendants of wild ones, but, under the care of man, many of them have changed so greatly that it is now hard to tell from which wild form they are descended. Eurasia seems always to have been the home of by far the greater part of mankind, and it is therefore natural that most of our domestic animals and cultivated plants are descended from wild animals and plants of that grand division.

Supplemental Work. Bring to school a picture, a specimen, or a description of some plant or animal of the North American region, and of some plant or animal of the Eurasian region.

Read chapter 41 in "Carpenter's Geographical Reader, North America."

ISLAND LIFE AND OCEAN LIFE

111. Island Life. Continental islands are usually close to the mainland, and many of them have not long been separated from it; hence their plants and animals are generally similar to those of the neighboring continent.

The oceanic islands also have received their life forms mainly from the continents. These consist chiefly of birds which can fly long distances, and of such forms as have seeds or eggs which can be easily transported. Some of these are so light that they will float or can be carried by the winds. Some are carried in the stomachs of birds, or attached to mud on their feet.

112. Ocean Life. Many warm-blooded animals, such as whales, porpoises, seals, and walruses, live part or all of the time in the sea, but come to the surface of the water to breathe. In addition to these are hosts of true fishes that can live and breathe under water, such as sharks, mackerel, and codfish, and the many kinds of shellfish, as oysters and lobsters. The sea also contains low forms of animal life in great variety, such as jellyfishes, sponges, and coral polyps, as well as many kinds of seaweed and other marine vegetation.

Light penetrates the ocean to a comparatively slight depth; and the water, except a thin surface layer, is almost as cold as ice; hence vegetable life in the ocean is more plentiful near the surface, and especially in the shallow waters near the continents. As food is thus most abundant in these regions, animal life also is most plentiful, though a few kinds of marine animals live near the bottom of the deepest parts of the sea.

Supplemental Work. Read "Animal Life in Madagascar" in Johonnot's "Flyers, Creepers, and Swimmers," and Parts III. and IV. of Johonnot's "Glimpses of the Animate World."

TOPICS ON DISTRIBUTION OF LIFE

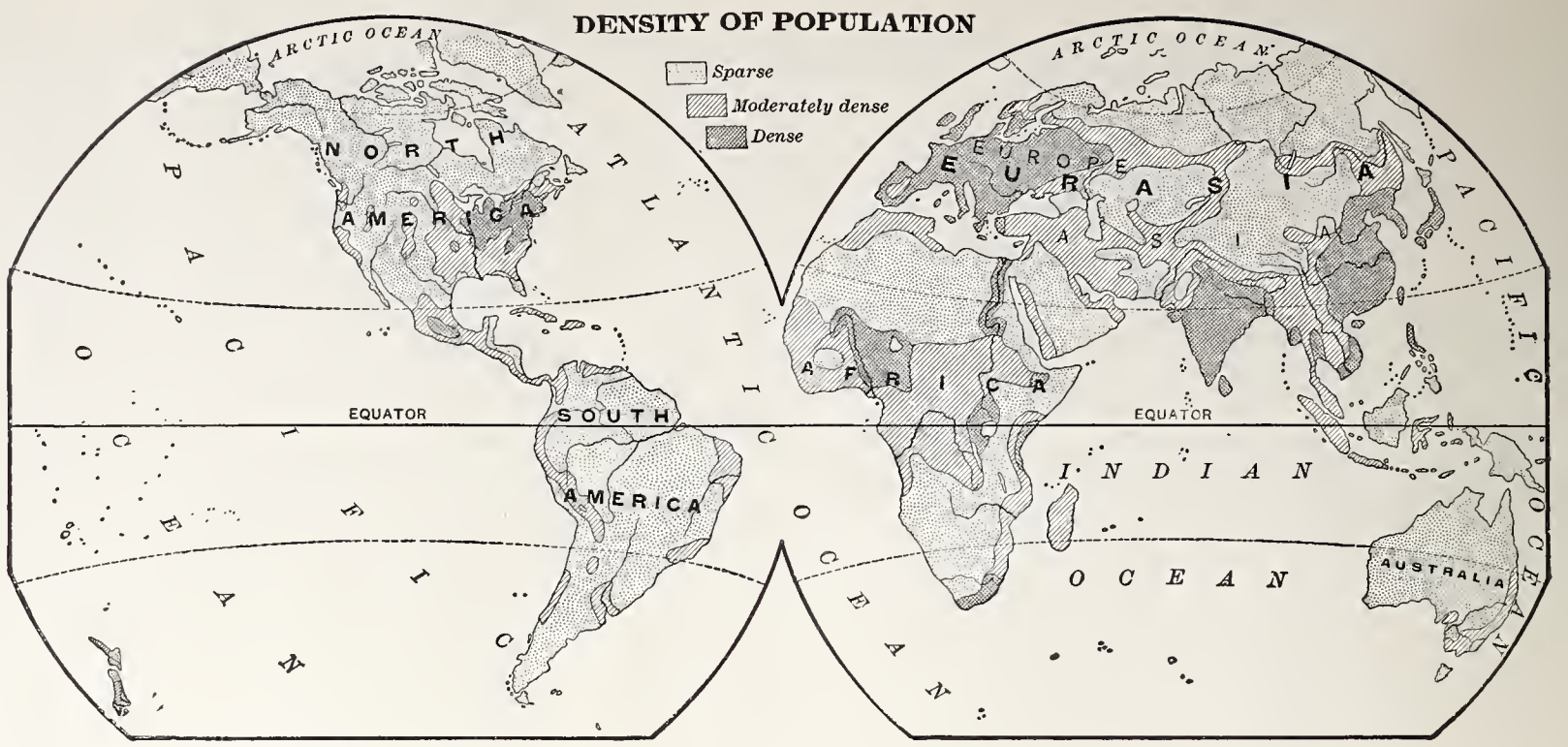
I. Number of Life Forms. Effect of climate on; resulting distribution.

II. Kinds of Life. Forests: equatorial; temperate. Grassy lands: cause, distribution. Tundras: cause, distribution. Deserts: cause, distribution, forms of life.

III. Barriers. What they are. What they cause.

IV. Life Regions. Continental plateau: central regions — common forms, peculiar forms, present barriers; outlying regions — number, most peculiar forms, chief forms of each; islands. Oceanic region: island life; sea life.

RACES OF MANKIND



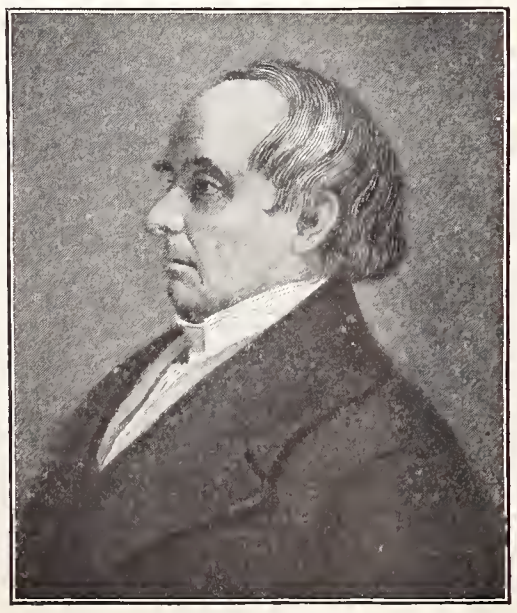
113. Distribution of Population. Man is vastly more intelligent than any of the lower animals. Thus he knows how to kindle a fire, and how to use it; to make the tools with which to fashion clothing and shelter; and to make weapons with which to defend himself. His intelligence also gives him the foresight to lay up food in summer for use during the winter, and to carry food with him when he travels to regions that do not supply it. Hence the barriers which prevent the spread of the other forms of life are not great barriers to man; men therefore live in nearly all the lands of the earth.

A region thickly peopled is said to have a *dense population*. In other regions one might travel for many miles without seeing a human being or any sign that people lived there. Such a region is said to have a *sparse population*. The regions of dense, moderately dense, and sparse population are shown on the map.

The two principal regions of dense population in eastern and southern Asia contain about half the people of the world, and the region of dense population in Europe contains nearly half of the remainder, so that these three regions of dense population in Eurasia contain fully twice as many people as all the rest of the world.

114. Races. It is believed that many ages ago men wandered away in various directions from some central region, and made homes for themselves in new lands where they found very different surroundings. To these their descendants gradually adapted themselves, just as the descendants of plants and animals gradually change and adapt themselves to changing conditions of life. Thus are thought to have arisen the *races* into which mankind is usually divided. Because of differences in the color of the skin the races may be called the *white* race, the *yellow* race, the *brown* race, the *red* race, and the *black* race.

115. White Race. The home of the white or "Caucasian" race is Europe, southern and southwestern Asia, and northern Africa. The people have fine, wavy hair, and most of them have pinkish white skin, though some are quite dark. This race includes nearly half the people in the world, and is the most civilized of all the races. There are two principal divisions of this race, the *Aryans* and *Semites*. The Aryans include most of the people of Europe and many of those of southern Asia. In recent times thousands of the Europeans have left Europe to found homes in other parts of the world, and they have practically taken possession of North and South America and of Australia, and are rapidly taking possession of Africa. The Semitic people include the Jews, Arabs, and their descendants. Their home is south and southeast of the Mediterranean Sea.



WHITE RACE.

116. Yellow Race. The home of the yellow or "Mongolian" race is northern and eastern Eurasia. The people of this race have straight, coarse, black hair, almond-shaped eyes, and yellowish skin. They are nearly as numerous as those of the white race, but most of them are not so highly civilized. The Japanese are the most progressive of the yellow people, but the Chinese are by far the most numerous.

117. Brown Race. The home of the brown or "Malay" race is extreme southeastern Asia, the Philippines and other islands of the East Indies, Hawaii, and other small oceanic islands of the Pacific. The people of this race have straight, black hair and a brownish yellow skin. They are sometimes included in the yellow race.

YELLOW RACE.

118. Red Race. The red or "American" race occupied the whole continent of America before it was settled by white men. The

people of this race are called Indians. They have straight black hair and reddish yellow or copper-colored skin; by some they are included in the yellow race. Many of them were roving savages when white men first came to America, but some tribes in the western highlands of both North and South America lived in permanent houses of stone or of sun-dried clay.

119. Black Race. The home of the black or "Negro" race is central and southern Africa and some of the Australian islands. The peoples of this race have coarse woolly or kinky hair, protruding lips, and dark brown or black skin. The black race includes some of the most ignorant people in the world.

The true *negroes* live in central Africa. The small black people who live in some of the islands north of Australia are called *negritos*, or Papuans. The natives of Australia itself have black skin but straight hair, and by some are thought to be a separate race.

BLACK RACE.

RED RACE.

BROWN RACE.

MANNER OF LIFE

120. Savagery. It is probable that in very early times people lived in caves or trees; ate only such things as roots, wild fruits, insects, and the fish or wild animals they could kill. They wore no clothing but skins of animals; had few weapons except clubs, wooden spears, and bows and arrows; and only such tools as they could make out of stone, bone, and wood. The natives of Australia and the negritos in the Philippine Islands still live in this way, and some tribes of negroes in Africa and of Indians in America have made scarcely more progress. Such people are called *savages*, and their manner of life is called *savagery*.

121. Barbarism. After many years in savagery some people learned how to live more easily and safely. They found that pottery could be made of clay. They learned how to cultivate grain, and, in Eurasia, they tamed the wild cattle, sheep, and goats, and kept them in herds. Their supply of food was thus surer and more plentiful. From wool and the fibers of plants they learned to weave coarse cloth. In time they learned to use metals instead of stone in making their tools and weapons. Even if they have not learned to read and write, people who can do these things can live in greater comfort than savages. They may be called *barbarians*, and their manner of living, *barbarism*. Some of the negro tribes of Africa and the Mongolian tribes of northern Asia are to-day in the stage of barbarism, and most of the Indians in America when it was first visited by white men were barbarians.

122. Civilization. When at last men learned to read and write, and were thus able to leave a record of what they did and thought, they could do many other things which enabled them to live more comfortably than barbarians. They had learned to build substantial houses, and lived in permanent homes. They maintained schools of some kind; carried on some regular business, as farming, trading, or manufacturing; and had some established government to maintain order. People who live in this way are said to be *civilized*, and their stage of culture is called *civilization*.

Most of the yellow race and part of the Malay race have reached some degree of civilization. But some people learn more rapidly than others, and the Caucasian race includes the most enlightened people in the world.

GOVERNMENT AND RELIGION

123. Government. In very ancient times there was so little property that it was not necessary to make rules or laws concerning it. People owned things in common. In time of peace the father of the family or the old men and women of the tribe gave counsel to the others; and in time of war the ablest warriors were chosen as chiefs to lead the various war parties.

As men gradually increased in knowledge, however, and were able to accumulate flocks and herds or other valuable property, they frequently disputed about its ownership. The stronger often seized upon the possessions of the weaker, whom they forced to serve them.

In this way, especially in Europe, two classes of people were developed: the rich and powerful families, who made all the laws; and the great mass of common people, who at last came to think that the powerful families were nobles born to rule them.

Still later the strongest of the nobles claimed to be the *king*, or *monarch*, of a great region surrounding his home, and to own all the land and the people living on it; but he gave parts of the region to the weaker nobles living on it, on condition that they should help him in war and acknowledge that he, and one of his family after his death, should be monarch. Thus *monarchies* were established in many parts of Eurasia.

124. Monarchies. The first monarchies were *absolute*, or *despotic;* the monarch made all the laws and could put any of his subjects to death. Only a few absolute monarchies still exist; for as the people gradually became more civilized, little by little they took much of the power away from the monarch. In these more civilized countries the laws are made by a body of men, composed partly of nobles and partly of men chosen from the common people, while the monarch enforces the laws thus made. Such are the governments of most of the countries of Europe to-day. They are called *limited* or *constitutional* monarchies.

ST. PAUL'S, LONDON.

125. Republics. In some countries, when the common people became strong and enlightened, they decided to take the powers of government into their own hands and to do away entirely with the monarch and nobles. In such countries the people elect a body of men to make the laws, and a chief officer, or *president*, to see that the laws are executed. These men hold office only a few years, and then others are chosen to succeed them. Such a government is called a *republic*. The United States is a republic.

126. Religions. While the wisdom and necessity of human government are recognized, most people believe in a higher power than man, this belief forming the basis of their *religion*.

The *Jewish* religion was proclaimed by Abraham in southwestern Asia about four thousand years ago. The Jews believe in one God and in the Old Testament. Jews are now found in all civilized countries, but most of them live in Europe.

Christianity teaches that Jesus Christ is the Son of God, and the Savior of mankind. Christians believe in one God and in the Holy Bible. This is the prevailing religion in Europe, America, and the other more highly civilized parts of the world. About one fourth of mankind profess Christianity. The chief divisions are the Catholic, the Greek Orthodox, and the Protestant churches.

Mohammedanism was proclaimed by Mohammed, about thirteen hundred years ago. Mohammedans believe in one God, but the Koran is their holy book. This is the prevailing religion in most of northern Africa and southwestern Asia. Its followers include about one tenth of the people in the world.

Brahmanism is a very old religion of southern Asia. Its chief god is called Brahma. This religion divides its followers into classes, or *castes*, and the members of different castes are not allowed to eat the same kind of food, follow the same business, or associate with one another. More than one tenth of mankind are Brahmanists.

ST. BASIL'S, MOSCOW.

ST. PETER'S, ROME.

Buddhism is professed by most of the people of eastern Asia, and its followers embrace more than one third of the human race. It denies the existence of a soul, but teaches charity and kindness to all living things.

Paganism. The more ignorant tribes of men are pagans. They believe in many gods or spirits, and worship them, or idols representing them. There are about as many pagans as Brahmanists.

AGRICULTURE

127. Industries. The production of raw material for food, clothing, and shelter gives rise to five great industries: *agriculture*, *herding*, *fishing*, *lumbering*, and *mining*. The fitting of raw material for use gives rise to the industry of *manufacturing;* the distribution of raw material and the manufactured product gives

WHEAT HARVESTING ON THE CENTRAL LOWLAND OF THE UNITED STATES.

rise to the industry of *commerce*, or trade and transportation. These seven industries afford occupation and the means of livelihood to the greater part of civilized mankind.

128. **Agriculture**, or the cultivation of plants for man's use, is the most important of the industries. It gives occupation to about one fourth of the world's civilized workers.

Plants need for their best growth the proper food and the right amount of heat and moisture. Part of their food is taken from the ground through their roots, but as all plants do not require the same food, different crops are planted in successive years. This *rotation of crops* greatly retards the exhaustion of plant food in the soil. Occasionally the soil is replenished with plant food by adding manure or other *fertilizer*.

The supply of moisture may be regulated by *draining* if there is too much, and by *irrigation* if there is too little. Irrigation consists in conducting water in a canal from some stream or reservoir, and distributing it over the land in ditches.

Among the best farming lands of the world are the plains drained by the great rivers of the temperate regions; but wherever there are soil, warmth, and moisture sufficient for plants, food may be raised.

129. **Cultivated Plants**. The chief food plants store nourishment in seeds which are called *grain*. Wheat, rice, corn, rye, oats, and barley are the most important kinds of grain.

Wheat grows best in a rather cool climate, and hence is extensively cultivated in the lowlands of both temperate zones, and in the highlands of the torrid zone. It forms the chief food of the people of America and western Europe.

Rice is raised in rather warm climates, and chiefly in localities that can be easily flooded.

Corn thrives well wherever the weather is hot and moist during its short growing season. It is one of the chief foods both of man and of the domestic animals.

Rye, *oats*, and *barley* are cultivated in the cool parts of nearly all countries in the temperate zones.

There are other plants used for food, some of which, like the potato, store nourishment in their underground stems, while others, like the beet, store it in their roots. About half of the sugar used in the world is made from the beet. The other great sugar-producing plant is the sugar cane, a kind of grass which looks much like Indian corn. It requires a hot, moist climate.

Of *fruits*, the apple is the most important of the temperate zone, since it can easily be kept throughout the winter. Oranges and lemons, also much used, are raised in warmer regions, and bananas and dates form the chief food of man in some tropical countries.

Tea is grown in both temperate and tropical parts of the eastern hemisphere, while *coffee*, a native of the tropical climate, is cultivated in both hemispheres.

Fibers. Cotton is the most important plant cultivated for other purposes than food. From this plant is obtained a fiber of which is made the most widely used cloth in the world. The cotton-producing regions of the world lie in the moist lowlands of the temperate regions. Flax, from which linen and linseed oil are obtained, and hemp and jute, from which rope and cordage are manufactured, are also fiber plants. They grow in both warm and cool countries.

Supplemental Work. Bring specimens of useful plants to school to form a collection. Bring to school a description of one grain, or root, or fruit, used by man as a food; of one useful plant not used for food.

HERDING

130. **Domestic Animals**. The raising of domestic animals is closely associated with farming, and nearly every farmer pursues this industry also to some extent. In many parts of the world, however, especially in the drier parts of the open grassy regions, where the rainfall is not sufficient for successful farming, the herding of horses, cattle, and sheep is the chief occupation.

IRRIGATED ORCHARD, ARIZONA.

CATTLE RAISING, WYOMING.

LUMBERING, WASHINGTON.

The draught and pack animals differ in different parts of the world, the most useful being the horse, the mule, the donkey, the camel, the elephant, the water buffalo, the ox, the llama, and the reindeer. The dog also is used in certain countries.

Cattle, the most important food animals, supply milk, butter, cheese, and beef. Hogs are raised in enormous numbers, especially in corn-producing regions, and also in forest regions where they can feed on the wild nuts. Though the flesh of sheep and goats is eaten, these animals are raised chiefly for their wool or hair, which is converted into clothing.

Much of the meat of these animals is eaten fresh, as it is possible to send live cattle and sheep long distances in cars or steamships. Fresh dressed meat may also be shipped in iced or refrigerator chambers. Meat may also be canned fresh, preserved by salting or smoking, or made into extracts.

When these animals are slaughtered, all parts of the carcass are now used. Bones, horns, and hoofs are made into combs, buttons, and glue. Hair and refuse wool are made into felt; bristles into brushes; even the blood is used to make animal charcoal.

Poultry are raised not only for food but also for their eggs. Both the live fowls and their eggs are articles of export from many countries.

From the alpaca, which is kept in large herds on the great highland of South America, and in some parts of the world from the camel, hair for cloth making is obtained.

Supplemental Work. Supply to the school collection such animal products as you can obtain. Bring to school an account of one domestic animal, describing it, and telling where and how it is raised and what its uses are.

FISHING

131. Fisheries. The most valuable fishing regions are the shallow parts of the sea near the shores of the continents, in the north temperate zone. Among these are the great cod fisheries on the "Banks" south of Newfoundland (p. 36), and the cod and herring fisheries of northwestern Europe. The salmon fisheries of the northwestern coast of America, and the oyster fisheries on both coasts of the north Atlantic, are also very valuable.

COD FISHING ON NEWFOUNDLAND BANKS.

The most valuable fresh-water fish are the whitefish from the Great Lakes of North America and from the lakes of northern Europe.

Certain sea animals other than fish are also considered valuable for other purposes than food. Among these are the fur seal of Bering Sea; the whale, prized for its oil and the whalebone from its mouth; the sponge; the pearl oyster; and coral.

Cod are usually caught by means of long lines, or *trawls*, having baited hooks attached every few feet. The trawls are held in place by anchors, and visited every day, the fish removed, and the hooks rebaited. The fish are cleaned and salted, and later, on shore, are dried in the sun before being sent to market.

Herring and mackerel, which are smaller than cod, are usually caught with long nets, called *seines*. Herring are salted, smoked, and dried, but mackerel are preserved in a strong brine. Very small herring, caught on the North American coast, are canned in oil, and called *sardines*, though the true sardines are caught in great numbers only off the south and west coasts of Europe.

Salmon are caught in rivers, up which they come from the sea to lay their eggs. These fishes are canned in great numbers on the west coast of North America.

Oysters live upon the bottom of shallow shore waters and are obtained by dredging, or with tongs. Immense quantities of them are taken along the coasts both of Europe and of America.

Pearl oysters, beautiful coral, and the sponge, the skeleton of which is the sponge of commerce, are found in the warmer parts of the sea.

Supplemental Work. Supply to the school collection some product of the sea. Bring to school an account of some sea animal or plant, or of the fisherman's life. Find out about the Fish Commission at Washington, and its work.

LUMBERING

132. Forest Products. From the forests come wood for fuel and lumber for houses and for other purposes. In addition many other useful products are obtained from trees. The pines yield tar, pitch, rosin, and turpentine. The sap of several kinds of tropical trees and huge climbing vines yields rubber; oak, hemlock, and other barks are used in tanning leather; much paper is made from wood ground to a pulp; and many trees yield drugs and dyewoods.

In many places trees are cut in the autumn and winter by lumbermen, who at these seasons live in camps in the forests. After the trees are felled they are cut into logs, which during the floods are floated down the nearest stream to the sawmill. Logs cut on a mountain side are often slid down artificial chutes. In some places railroads are built to carry logs to the mills or to the water. At the sawmills the logs are cut into square timber or into planks.

The various kinds of woods differ in grain, hardness, and durability, and are for that reason suited to different uses.

Supplemental Work. Supply to the school collection specimens of wood and forest products. Bring to school a description of one kind of useful tree, or an account of methods of lumbering. Find out about Arbor Day.

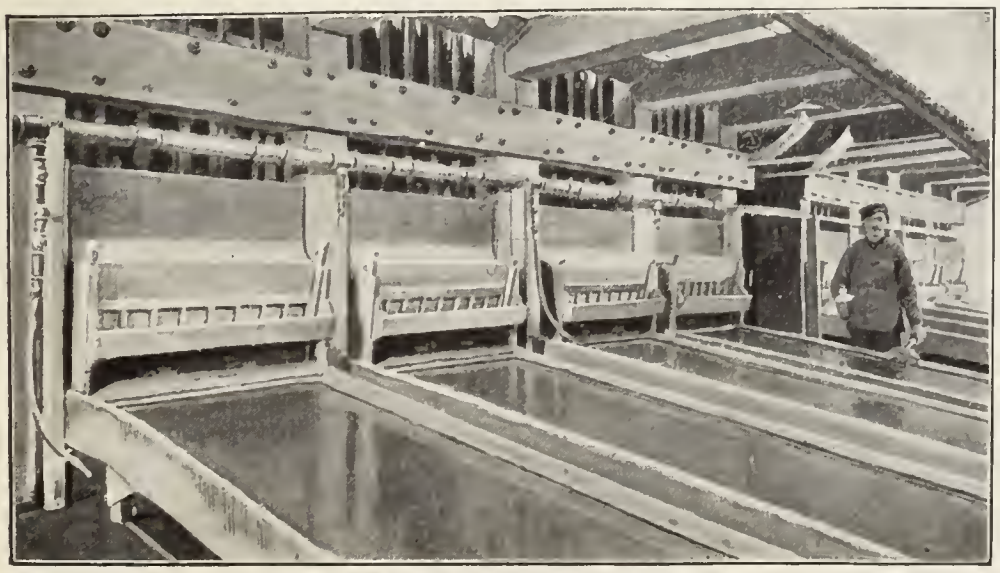
MINING

133. Mining is the process of getting minerals out of the earth. The most useful minerals are coal, iron, petroleum, copper, gold, silver, tin, lead, zinc, and building stones.

134. Coal. The most important branch of this industry is the mining of coal, which is extensively used for fuel and for making illuminating gas. Coal exists in all the grand divisions, but by far the greater part used is mined in western Europe and eastern North America.

We have learned (§ 71) how coal was formed. In some places the coal beds crop out at the sides of a valley or of a mountain, and the coal is mined by blasting tunnels into the bed; but in many places the coal can be reached only by sinking a deep hole, or shaft, to the bed. From the bottom of the shaft tunnels are made in the coal bed, and then the coal between the tunnels is taken out. Tracks are laid in the mines, and on them trains of cars dragged by mules or electric engines carry the coal to the mouth of the mine, or to the foot of the shaft, up which it must be hoisted.

Anthracite Coal Mine, Pennsylvania.



Gold Milling and Washing, Montana.

135. Iron. The next most important product of the mining industry is iron. Of all the metals iron is the most useful. One of its useful forms is steel.

Like most of the other metals, iron is not found pure, but is combined with other substances, forming *ore*.

Iron ore is found in nearly every country, but those mines which are most convenient to coal have been most worked; hence the great iron-mining regions of the world are usually in or near the great coal-mining regions.

Iron ore is sometimes found near the surface of the ground, where it is collected by pick, shovel, and scraper; but iron ore, as well as the ores of the other metals, is also mined underground in much the same manner as coal is mined.

The ore is put into great furnaces with coal, coke, or charcoal, and some *flux*, usually limestone. The burning of this fuel melts the ore, and the metal iron, made more liquid by the flux, then flows off nearly pure. This process is called *smelting*.

Steel Making (Bessemer Converter).

136. Gold and Silver are much scarcer than many of the more useful metals. One or both of them are used as money throughout the civilized world.

The rock bearing the gold is crushed to the finest powder in a "stamp mill," and the powder is then washed with water containing a substance which extracts all the gold but leaves the rock.

Fine pieces of gold, or "gold dust," are also found in the rock waste of gold-bearing rock, from which the gold may be separated by washing, and sometimes by collecting with quicksilver.

Stone is used extensively not only for building, but also for making roads and pavements. Slate rock is used for roofs, and much limestone as a flux in smelting iron. Great quantities of certain kinds of limestone are made into cement and lime.

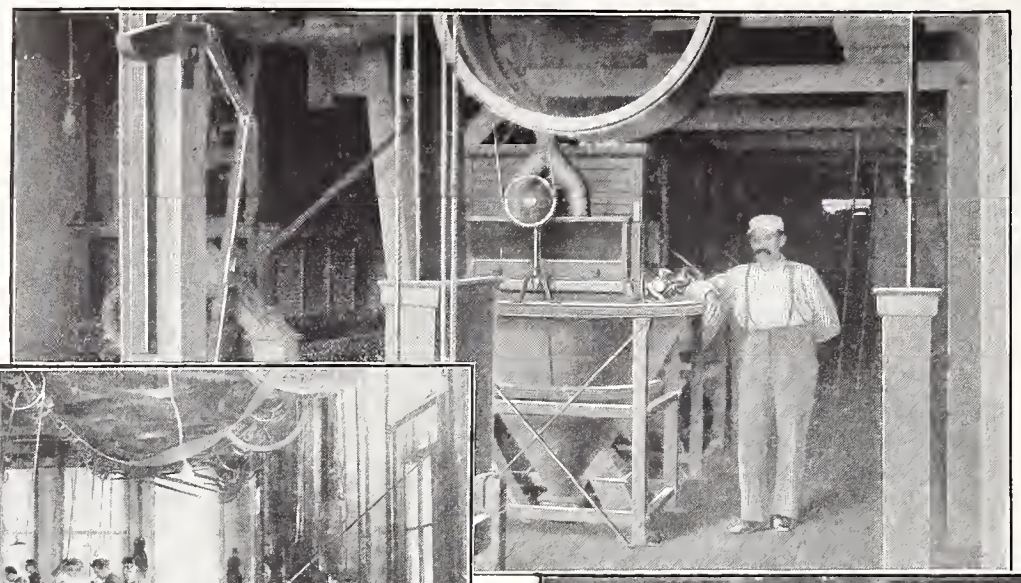
Supplemental Work. Bring to the school collection specimens of minerals, metallic ores, or stones. Bring to school an account of one mineral product, or of one method of mining or quarrying.

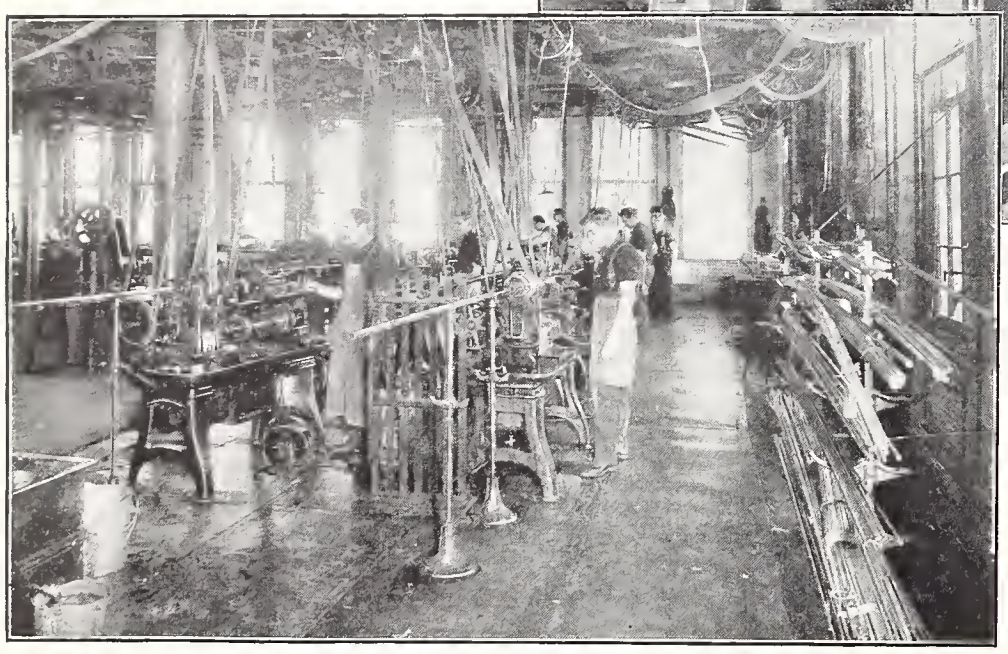
MANUFACTURING

137. Preparing raw materials for the use of man constitutes the industry of *manufacturing*.

Formerly most manufacturing was done in the homes of the people by the aid of simple tools or machines operated by hand, but nowadays it is done chiefly in factories by machinery run by steam or electricity.

FLOUR MILL, MINNESOTA.





MACHINE SHOP, NEW YORK.

138. Manufacturing Regions. Man now has engines to run machinery, and railroads and steamships to bring fuel and raw material to the factories and to distribute the manufactured goods; hence manufacturing towns grow up at convenient localities in various parts of the civilized world. Countries in which coal and iron are extensively mined, as in eastern North America and western Europe, have become most active in manufacturing. About one fourth of the white race are engaged in this industry.

139. Chief Manufactures. The chief manufacturing industries are the weaving of cloth, the smelting and working of metals, and the preparation of foods.

Textiles. Cotton is the most important cloth-making material. Wherever it is grown, the fiber is separated from the seed and then pressed into bales by machinery. The bales are then shipped to the mills and factories, where the fiber is spun and woven into cloth.

Somewhat as cotton is treated, so also is wool; silk; flax, of which linen is made; and jute, used for making coarse cloth.

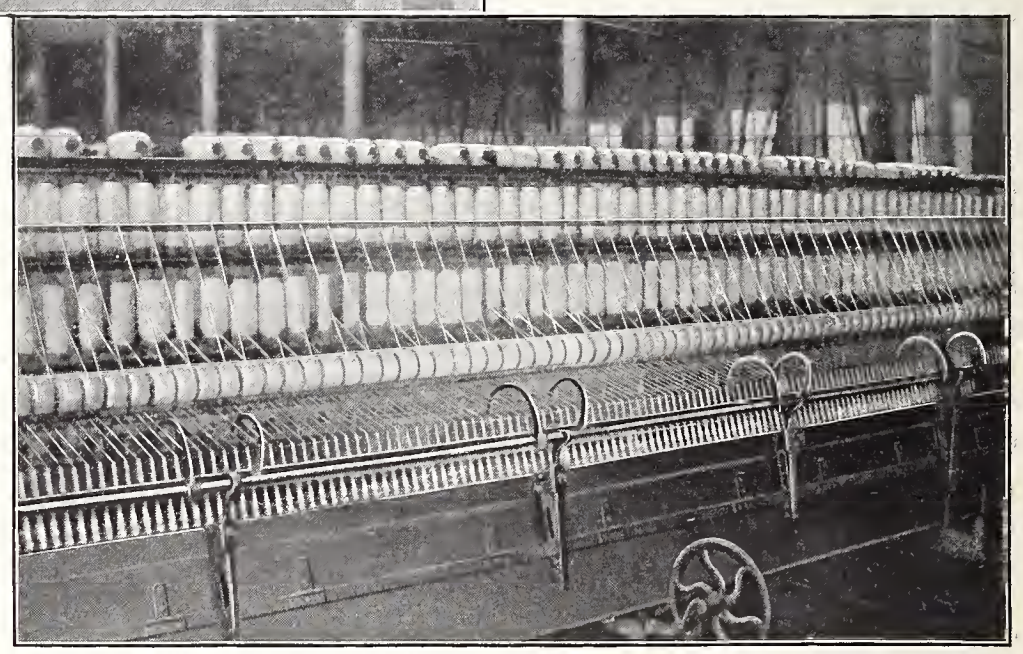
Metals. More iron and steel are used in manufactures than all the other metals put together. Copper, tin, lead, and zinc are used in the manufacture of hardware, and copper wire is used in electrical work. Tinware is made of sheet iron to which has been given a thin coating of tin. Lead is made into pipe. Zinc is used as a coating for iron, forming what is called galvanized iron; and when mixed with copper it forms brass.

Food. The conversion of the various grains into flour and meal, the canning of fish, meat, fruit, and vegetables, and the making and refining of sugar afford employment for thousands of people.

Supplemental Work. Find out about James Watt, Sir Richard Arkwright (Smiles's "Self-Help," Eclectic Readings), Eli Whitney and the cotton gin (Harris's "Stories of Georgia").

COMMERCE

140. Commerce. Different parts of the world produce different things, and what is produced in one part is often needed in another; hence the people of different regions sell their surplus products to one another. The buying, selling, and carrying of commodities make the industries of trade and transportation, which together are called *commerce*. When commerce is carried on between parts of the same country, it is known as *domestic* commerce, but



COTTON MILL, MASSACHUSETTS.

trade between different countries is called *foreign* commerce.

Railroads and steamships have made transportation cheap, rapid, and certain, and thus have made profitable the factory system of manufacture. They have made it possible also to send raw materials to distant regions to be manufactured, and to carry food to the manufacturing people from distant agricultural regions.

Wool from Australia, cotton from our own country, and silk from Asia are sent to Europe to be made into cloth, part of which is often sent back to be sold in the very countries where the raw materials were raised; and the people of the western part of Europe rely upon the people of North America for much of their wheat, flour, beef, and pork, and upon Australia for part of their mutton. Tea comes from Asia; coffee from South America; and most of our sugar from the West Indies, South America, and the islands of the Pacific.

As only the products not used at home are exported to other countries, foreign commerce forms a very small part of the whole commerce of the world.

141. Means of Transportation. Goods are transported not only on railroads and ships, but also by teams on

A Modern Ocean Steamship.

Railroad Yard and Harbor, Tacoma, Washington.

common roads, and by boats on rivers and canals. Teaming is necessary in carrying goods to all the commercial routes, but it is the most expensive mode of transportation. A team pulls so small a load and travels so slowly, that if the distance is great, the food and care of the team will cost as much as the load is worth. Transportation by river, canal, or sailing vessel on the ocean is very cheap, though much slower than by railroad or steamship. In the more civilized countries most of the traffic is carried by railroad, and about half of the ocean traffic is by steamship.

142. Aids to Commerce. Telegraph cables, laid on the sea bottom, connect all the continents, so that information can be sent instantly to the most distant countries; and postal routes have been established, by which, at little cost, letters may be quickly and surely delivered to any place in the world. The telegraph, the telephone, and the post office are invaluable aids to commerce.

In order to promote foreign commerce, each country has, in all the large trading cities in the world, men called *consuls* to look after the interests of its sailors and merchants who trade there, and to collect information about what the people of the country produce and what they need. Most civilized countries also issue maps of the coasts and harbors, and build lighthouses and life-saving stations along the coasts. In many countries the harbors and rivers have been deepened or improved. In some countries the government owns the railroads, and in nearly all civilized countries it has aided in building them.

Supplemental Work. Make a list of the articles on the breakfast table this morning and try to find where each article came from, and how it was manufactured. Write a history of one article on your list. Find whether any article produced in your neighborhood enters into our foreign or domestic commerce. Find out about Robert Fulton, Samuel F. B. Morse, and Thomas A. Edison (Perry's "Four American Inventors") and George Stephenson (Smiles's "Self-Help," Eclectic Readings).

A Business Street, New York.

TOWNS AND CITIES

143. Centers of Population. Most of the trade and manufacturing of the world are carried on in towns and cities. Although the raw materials themselves are seldom produced there, they are usually sent there to be manufactured and sold. In general, therefore, cities and towns are centers of population in which goods are assembled, manufactured, or distributed.

Thus a city is a convenience both to producers and to purchasers, and therefore it must be within easy reach of both. Hence cities have usually grown up at good harbors, or on navigable rivers or lakes, or at the junction of railroads. Many are at waterfalls or rapids, or near mines of some kind. Among the cities and towns, the one that can be most easily reached by the greatest number of people, and by the greatest amount and variety of products, is sure to grow to be the largest. Many of the large cities of the world started as military posts.

Supplemental Work. Try to find out why the town in which you live, or the town nearest your home, is located where it is. It is located just where it is for *some* reason.

If you live in the city, write an account of some visit which you have made to the country; if you live in the country, write a description of the largest town which you have seen, and tell how it differs from the place where you live.

TOPICS ON MAN AND HIS PROGRESS

I. Population. By number: dense; moderate; sparse. By races: white; yellow; brown; red; black.

II. Progress. In intelligence; in culture; in government.

III. Industries. Procuring material: vegetable; animal; mineral. Transforming materials: by hand; by machinery. Exchanging goods: transportation — by land, by water; trade — domestic, foreign; aids.

NORTH AMERICA

Scale 600 miles to one inch, same as the maps of South America, Eurasia, Africa, and Australia

SCALE OF MILES

0 100 200 300 400 500 600 700 800 900 1000

The highlands above 2000 feet are shown in the buff tints, the lowlands in the green tints, and the submerged part of the continental plateau in the light blue tint.

Longitude West from Greenwich

130 120 110 100 90 80 70

E.Y. FARQUHAR DEL. BRADLEY & POATES ENGR'S N.Y.

NORTH AMERICA

LAKE LOUISE, IN THE ROCKY MOUNTAINS OF CANADA.

PHYSICAL FEATURES

The Map Exercises (in small type at the beginning of sections) form an important part of the course.

Location, Coast Features, and Relief.[1] What ocean is north of North America? east? west? What strait separates North America from Asia? What isthmus connects it with South America? In what zones does it lie?

Name a bay and two peninsulas on the north coast. Name two gulfs and a sea on the east coast. What three peninsulas are on that coast? Name a gulf, a sea, and two peninsulas on the west coast. Which coast seems to be the longest? which the most regular? Off which coast are the largest islands? Name the largest. What island is east of the Gulf of St. Lawrence? What island chain partly incloses Caribbean Sea? Name the largest island on the west coast.

In which part of North America is the great highland region? In what direction does it extend? Measure its greatest width, using the scale of miles. What long mountain chain extends through the central part of the highland region? What three ranges border the highland on the west? Name two highland regions in the eastern part of North America. Which part of North America is a great lowland plain? Compare the Atlantic and Pacific coast plains in width.

North America, in which we live, is one of the natural grand divisions of the continental plateau (§ 20). It is the third in size, and it includes less than one fifth of the land in the world. It is roughly triangular in shape, but the northern and eastern sides are quite irregular.

The summits of the great mountain ranges of the west are from two to nearly four miles above the sea. The plateau from which they rise is itself a mile high. Mount McKinley, in the north, is the highest peak in the grand division. East of the Rocky Mountain chain the highlands slope gradually to the Central Lowland; west of this chain the plateau surface is broken by short mountain ranges and deep canyons. Throughout the western part of the highland region there are numerous volcanoes, some of which are still active. Old outflows of lava, known as "lava fields," are common throughout the region, and earthquakes are frequent.

Through the western highlands extends the divide separating the part of the grand division which slopes to the Pacific ocean from the part which slopes to the Atlantic and Arctic oceans. This is called the *continental divide.*

The eastern highlands, though less extensive, are much older than the western highlands. They have been worn down by ages of weathering until their highest peaks are but little higher than the plateaus at the foot of the Rocky Mountains. Mount Mitchell, in the south, a little over a mile high, is the loftiest point of the Appalachian chain. Mount Washington, farther north, is nearly as high. The Laurentian plateau, still farther north, is generally low, and contains many isolated hills.

Between the western and the eastern highlands is the broad Central Lowland, extending from the Gulf of Mexico to the Arctic Ocean.

Drainage. What river of the Central Lowland flows northwest to the Arctic Ocean? What three large lakes are in its basin? What river flows northeast to Hudson Bay? What lake is in its basin? What large river

[1] In the physical maps of this book, the dark green indicates the parts of the lowlands which are less than 1000 feet above the sea, while the light green indicates such parts as have an elevation between 1000 and 2000 feet. The lightest buff tint shows the lowest parts of highlands, where the elevation is between 2000 and 4000 feet; the medium buff tint shows regions between 4000 and 6000 feet; the darkest buff tint shows regions which are over 6000 feet above the sea. The lines separating the different tints and colors thus indicate definite elevations, and are called *contour* lines.

flows into this lake? What river flows northeast to the Gulf of St. Lawrence? Name five "Great Lakes" in its basin. What great river of the Central Lowland flows south to the Gulf of Mexico? What is its longest tributary? Name a river which flows southeast to the Gulf of Mexico.

Name the three largest rivers of the Pacific slope. Into what body of water does each flow?

In what direction do most of the rivers of the Atlantic plain flow? How do they compare in length with those of the Central Lowland? with those of the Pacific slope?

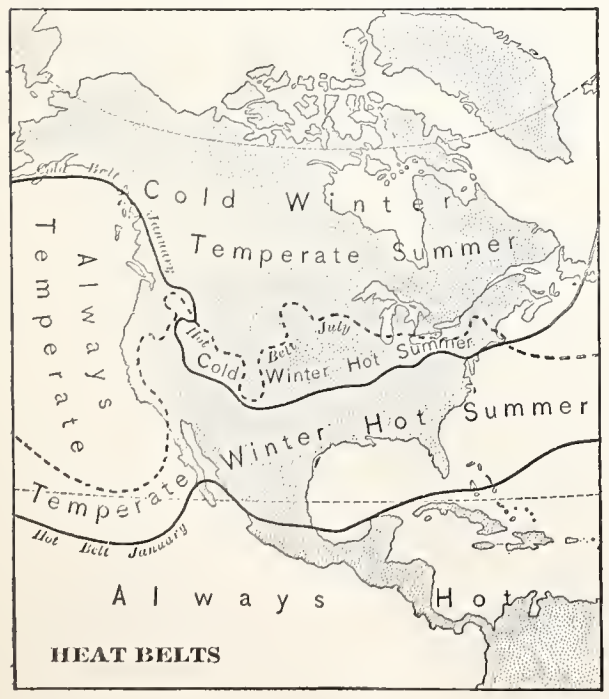
There are eight great river systems in North America, reckoning the Nelson-Saskatchewan as one system. Five of them lie partly in the Central Lowland, and only three lie on the Pacific slope. All these river systems except the St. Lawrence system have their headwaters in the Rocky Mountain chain, which for a great part of its length forms the continental divide.

The Mississippi-Missouri is the world's longest river, and as it is unobstructed by falls or rapids for a long distance from its mouth, it is of great commercial importance.

Just below the Great Lakes the St. Lawrence is obstructed by rapids, so that canals are necessary for the ascent of boats; but below the rapids large seagoing vessels ply during that part of the year when the river and gulf are not blocked by ice.

The waters into which the Mackenzie, Yukon, Colorado, and Mississippi flow, are nearly tideless, and consequently these rivers have built great deltas (§ 57). There is a bar at the mouth of the Columbia, though it is well covered with water even at low tide. The estuary (§ 28) of the St. Lawrence is a submerged valley.

North of the Missouri and Ohio rivers the divides between most of the streams in the great Central Lowland are so low as to be almost imperceptible. There are thousands of lakes in this region (§ 60). Many of them are so close together that the usual mode of travel used to be by canoes; these were carried on the shoulders of the travelers from one lake to another across the low divides. Such a divide is therefore called a *portage*, from a word which means "to carry."



Climate. This small map of heat belts shows the different temperature regions of North America, with their seasonal changes (§ 82).

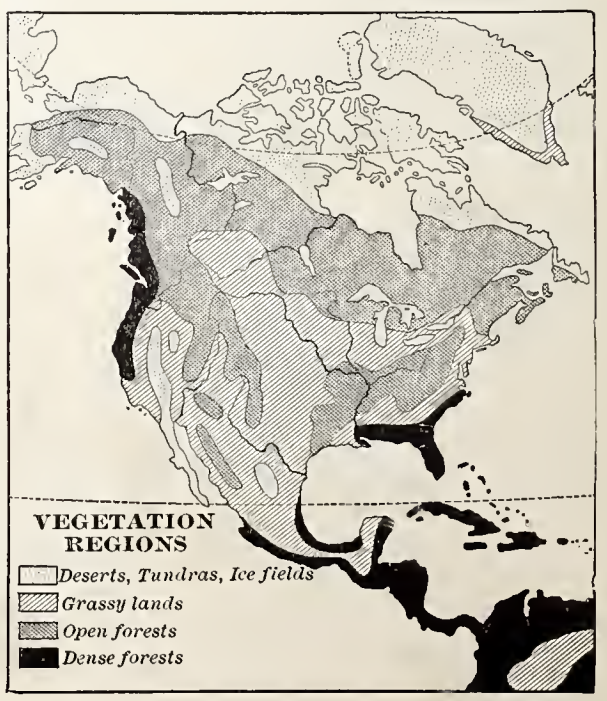
The central part of the west coast is always temperate, because the prevailing westerlies, which have the nearly uniform temperature of the Pacific Ocean, warm the coast in winter and cool it in summer (§ 86). By the time the winds reach the eastern part they have acquired the temperature of the land over which they have traveled; hence the eastern part is colder in winter and hotter in summer than the west coast.

The map at the top of this page shows the distribution of rainfall over North America. Along the northwest coast the prevailing westerly winds deposit copious rainfall as they ascend the abrupt slope of the great highland region. The region near the head of the Gulf of California is crossed by the tropical calms and hence has but little rain (§ 93 and map). In the southern part of North America the northeast trade winds bring copious rains to the east slopes in winter; but in summer, when the heat equator lies farthest north, monsoon winds from the Pacific bring rain to the southwest coasts. Farther north, the westerly winds, which have lost their moisture on the west side of the Sierra Nevada and Cascade Mountains, reach the plateau as dry winds. In the eastern half of the grand division, where the southerly winds in cyclones bring vapor from the Gulf of Mexico and the Atlantic, there is abundant rainfall.

Supplemental Work. Draw a circle to represent the western hemisphere, and make a sketch map showing what part of the hemisphere is covered by North America. Draw, on a larger scale, the outline of this grand division. Model North America. Write a comparison of the climates of the eastern and western coasts of North America.

VEGETATION AND ANIMALS

Vegetation. This map of the vegetation regions of North America, when compared with the maps of the heat belts and of rainfall, shows the influence of climate upon vegetation. In the regions of abundant rainfall in the warm south and the temperate west, heavy forests cover much of the surface. In the east, where the summers are long and the rainfall is ample, open forests and grassy prairies (§§ 99, 100) are found. In the drier region farther west the forests are confined chiefly to the mountain sides, which receive more rainfall than the adjacent lower country. West of Hudson Bay



Some Animals of North America.

the heat and moisture are sufficient for a sparse growth of forest, but farther north the summers are too short, and most of this region is barren land or tundra (§ 101).

Animals. (Review § 109.) Along the Arctic coasts the largest animals are the polar bear and the musk ox. Farther south, in the open forests, range the moose, the elk, and vast herds of woodland caribou, or American reindeer. Here the brown and black bears, the lynx, wolverine, and smaller animals, such as the beaver, otter, and mink, are hunted or trapped for their fur, which grows fine and thick on the approach of the long, cold winter, and is of great commercial value. In the highlands of the west are the grizzly bear, the bighorn sheep, the Rocky Mountain goat, and the puma, or American panther.

Throughout the eastern part of the grand division, south of the Great Lakes, the larger native animals have been nearly exterminated. In that region are vast numbers of domestic animals, — horses, cattle, sheep, hogs, and chickens, — whose ancestors were brought to America from Eurasia by the white man.

In the dry transitional region (§ 104) of the southwest are found animals of both the North American and the South American region, as well as many peculiar scorpions, lizards, and other reptiles.

In the hot lowlands of the southern part of the grand division, animals of the South American region are common, such as alligators, monkeys, vampire bats, and jaguars, as well as brilliantly colored parrots and many kinds of humming birds.

Supplemental Work. Make a list of the forest trees growing in your neighborhood. Make a list of the wild and domestic animals found in your neighborhood.

PEOPLE AND COUNTRIES

People. North America as a whole is very thinly peopled. It contains less than half as many people as it would have if the population of the world were evenly distributed over all the land. By far the largest number of people in North America live between the Great Lakes and the Gulf of Mexico, and on the islands and mainland south of the Tropic of Cancer. In parts of these regions the population is dense. In nearly all the remainder of the grand division the population is sparse, especially in the north, where it is very sparse.

The population map indicates the distribution of population and, in a general way, the distribution of races. The northern part of the grand division is occupied almost exclusively by Eskimos and Indians. South of the Great Lakes and the Saskatchewan River three races are represented, — Indians, whites, and negroes; whites and negroes in the east, and whites and Indians in the west.

NORTH AMERICA

Scale 600 miles to one inch, same as the maps of South America, Eurasia, Africa. and Australia.

SCALE OF MILES
0 100 200 300 400 500 600 700 800 900 1000

E.Y. FARQUHAR DEL.

L. L. PEATES ENGR'G CO., N.Y.

The reasons for this distribution of population and races are partly climatic and partly historical. If you will compare this population map with the maps of the heat belts and rainfall on p. 38, you will see that practically all regions in which the population is dense or moderately dense have an ample rainfall, and that most of them either have hot summers or are always temperate. These are the climatic conditions which adapt a region for agriculture; and it is in such regions, where farming may be carried on, that most of the white and negro races live. In the regions which are too dry or too cold for agriculture the population usually is sparse and the inhabitants are chiefly native Indians.

Map Exercise. In what direction are Greenland and Iceland from the mainland of North America? What large bodies of water border each of these islands? What country occupies most of America north of the Great Lakes? What is the region northwest of the Dominion of Canada called? What country is south of Canada? How do the United States and Canada compare in size? What country is south of the western part of the United States? What general name is given to the narrow region between Mexico and South America? Name the four largest islands of the West Indies. Which of them is nearest to the United States? Which is farthest east?

Countries. The historical reasons for the distribution of population and races are also connected with the subdivision of North America into countries. When Columbus discovered America the whole grand division was thinly inhabited by Indians, with a few Eskimos in the north. The inhabitants in the north and west were mostly savages; those in the east and southwest had reached a low stage of barbarism; but west and south of the Gulf of Mexico, where most of the Indians lived, they had advanced nearly to the lowest stage of civilization.

After Columbus, came civilized white men from Europe, who explored America, and some settled there. They were chiefly Spaniards, Frenchmen, and Englishmen. Still later the Russians came across Bering Sea and established fur-trading posts in Alaska.

The Spanish explored and made settlements in Mexico, Central America, and the West Indies. The French made settlements in the St. Lawrence valley, which they called Canada, and explored the Great Lake region and the Mississippi valley. The English established colonies along the Atlantic coast between the peninsulas of Nova Scotia and Florida, and also explored the northern part of the continent.

Several wars occurred among the French, the English, and the Spanish. In time the French gave up to the English Canada and the land they claimed east of the Mississippi River. Great Britain still owns Newfoundland and the Dominion of Canada.

In 1776 the thirteen English colonies south of Canada declared their independence, and united to form the republic of the United States. After the Revolution, Great Britain ceded to the United States the country south of Canada as far west as the Mississippi. Later, the United States acquired the region west to the Pacific, bought Alaska from Russia, annexed the Hawaiian and other islands in the Pacific, and obtained possessions in the West Indies.

Many thousands of people from western and central Europe have come across the Atlantic Ocean to seek homes in the United States and in Canada; their descendants now far outnumber the original Indian inhabitants. The Indians have been gradually driven westward and northward into the drier and colder and less desirable parts of the grand division by the ever-advancing tide of civilized white settlers.

Not long after the United States was formed, the Spanish colonies west and south of the Gulf of Mexico secured their independence and became republics. The largest of these is Mexico, while farther south there are six smaller republics, which together make up Central America.

There were always many more Indians in Mexico and Central America than farther north, and not nearly so many white men have settled in these countries, so that now by far the greater part of the people living in Spanish North America are either Indians or people of mixed Spanish and Indian blood.

Spain once owned the West Indies, but now has no possessions there. Cuba is a republic, and there are two republics in Haiti. Porto Rico belongs to the United States; Jamaica, the Bahamas, and many of the small islands are possessions of Great Britain. France, Holland, and Denmark also own islands in the group.

When the Spaniards took possession of the West Indies they enslaved the Indians as laborers, but great numbers of them died. Then negro slaves were brought from Africa to the islands and to the United States, where they did the field work on the plantations. Slavery has long since been abolished, but the descendants of these negroes still form a large part of the population in the southern United States and in the West Indies. They are about as numerous as all the Indians in North America.

Long before Columbus was born the Norsemen, bold sea rovers from Scandinavia on the northwest coast of Europe, made settlements in Iceland and Greenland. These islands are sometimes called Danish America, for they belong to Denmark, a part of old Scandinavia.

Supplemental Work. Sketch a map of North America and indicate the various regions originally settled by different European nations.

TOPICS ON NORTH AMERICA

I. History. Of great highlands: the older; the more recent. Of man: discoveries; conquest; subdivision into countries — United States, Canada, Spanish republics; treatment of Indians; of negroes.

II. Physical Description. Location. Surroundings. Extent. Shape: general shape; coast outlines — peninsulas, gulfs and bays; river mouths — estuaries, deltas. Surface: highlands — western, eastern; lowlands — central, western, eastern; divides — continental, lesser; slopes — Pacific, Central, Atlantic. Climate: temperature; winds; rainfall.

III. Life. Vegetable: forests — northern, eastern, western, southern; plains — tundras, pasture lands, farming lands. Animal: northern; western; eastern; southern. Human: distribution; races; countries.

PHYSICAL MAP

OF THE

UNITED STATES

Scale 330 miles to one inch, same as the maps of Canada and Europe

SCALE OF MILES

0 100 200 300 400 500

The highlands above 2000 feet are shown in the buff tints, the lowlands in the green tints, and the submerged part of the continental plateau in the light blue tint.

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Map Exercise. What lands and waters border the United States? Using the scale of miles, measure the greatest length and width of the United States. Trace the continental divide across it. What slope is west of this divide? What highland region embraces most of this slope? What mountains border this highland on the west? The region west of these mountains may be called the *Pacific coast region*. Toward what arm of the sea does most of our country slope east of the continental divide? Trace the northern divide of the Gulf slope. In what physical region is most of this divide? Toward what two arms of the sea does the surface slope north of this divide? Trace the eastern divide of the St. Lawrence and Gulf slopes. In what region is most of this divide? What slope is east of it? What region is embraced in this slope? Name the five chief slopes of the United States; the five great physical regions.

Supplemental Work. Make a sketch map of the United States and draw the divides between its five great slopes. Show the five physical regions on your map by shading with different colored pencils.

THE UNITED STATES

THE ATLANTIC PLAIN

The United States, the most important country of North America, occupies the central part of the grand division and extends from the Atlantic Ocean to the Pacific. It is traversed by all the great highlands and lowlands of the grand division.

In the east is the Atlantic plain, which is separated into two parts, physically distinct from each other, by the Hudson River (map, p. 42).

South of the Hudson the east half of the Atlantic plain is low, flat, and sandy. The coast is fringed with barrier beaches (§ 66), which inclose long, narrow lagoons. These lagoons are bordered with wide salt marshes. The sluggish streams have wide flood plains (§ 52), and, because the ocean tides ascend the larger streams through the width of this region, it is called the *Tidewater region*. Find this region on the map.

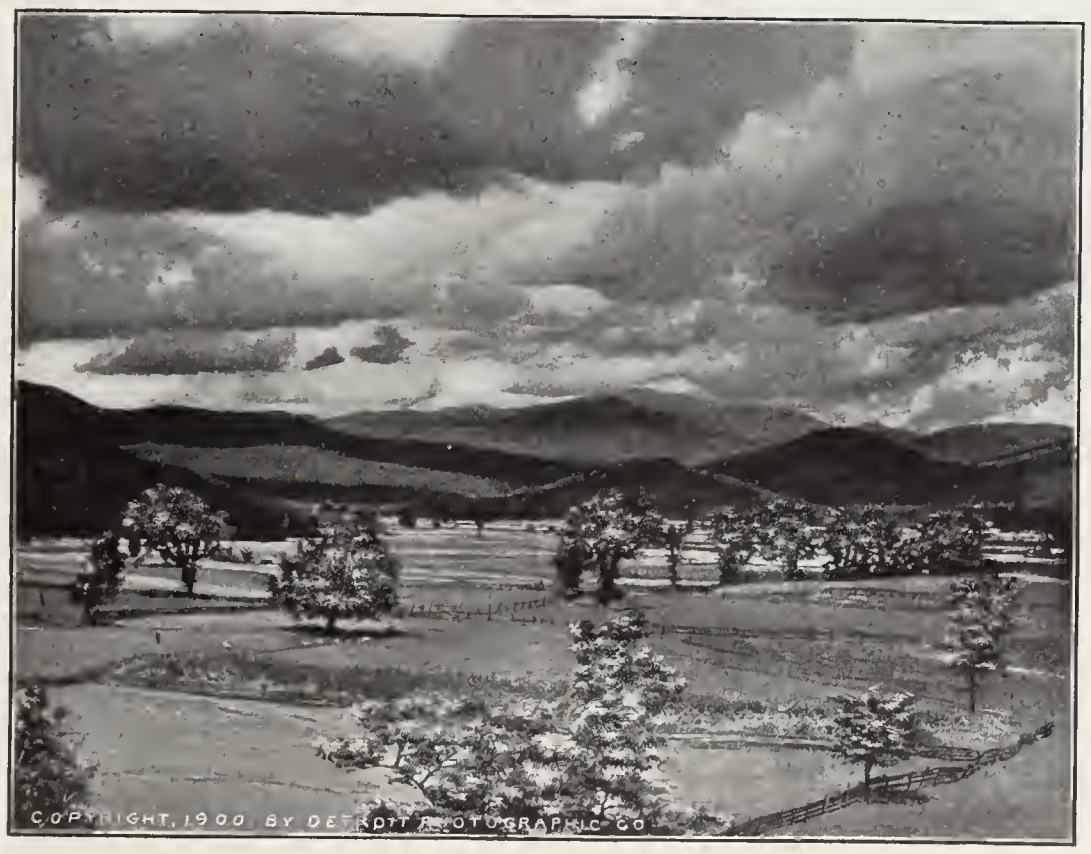
West of the Tidewater region the Atlantic plain rises more rapidly. The swift streams have cut wide and rather deep valleys (§ 49), leaving knolls and uplands of moderate elevation between. This is the foothill or *Piedmont region*.

The boundary between these two regions is often called the *Fall line*, because falls or rapids occur on nearly all the streams where they cross it. The larger streams are navigable from the coast to these falls, where freight must be transshipped. For this reason and also because the falls furnish water power for manufacturing, many cities and towns have grown up along the Fall line.

Long ago the seacoast was at the Fall line. The Piedmont region had been rough highland, but ages of erosion had lowered its surface, reducing it almost to a plain (§ 51), while the rock waste worn from it was deposited in nearly level layers on the sea bottom to the east of the Fall line, where it gradually hardened into rock (§ 69). Then both regions were slowly upheaved, and the newly made layers of rock became the low, flat Tidewater region. The upheaval of the Piedmont region quickened the current of its streams and enabled them to cut their present valleys, making its surface again somewhat rough and hilly. After river valleys had been worn in the Tidewater region some parts of it sank slightly, permitting the sea to extend far up the valleys to form estuaries. New York, Delaware, and Chesapeake bays were made in this way.

Northeast of the Hudson River the Atlantic plain is narrower and is mainly the Piedmont region, which extends in most places to the seacoast. Its hard rocks form bold headlands and rocky islets, between which are deep fiords (§ 28) and sheltered sounds. The whole region is covered with the remains of the old Laurentian glacier (§ 60), such as gravels, clays, huge bowlders, and round-backed glacial hills. Old valleys were dammed by the glacial drift; many lakes were thus formed, and the streams, turned from their old courses, have cut new channels in the hard rocks. These channels are not yet worn down to uniform slopes; therefore the streams abound in falls and rapids.

Long Island and the smaller islands east of it, as well as the peninsula of Cape Cod, are largely composed of the clays and gravels heaped up in the terminal moraine (§ 59) along the melting end of this old glacier.



Mount Washington, New Hampshire.

TOPICS ON THE ATLANTIC PLAIN

I. Northern Part. Width. Surface: hills; lakes; soil. Coast: indentations; projections; islands.

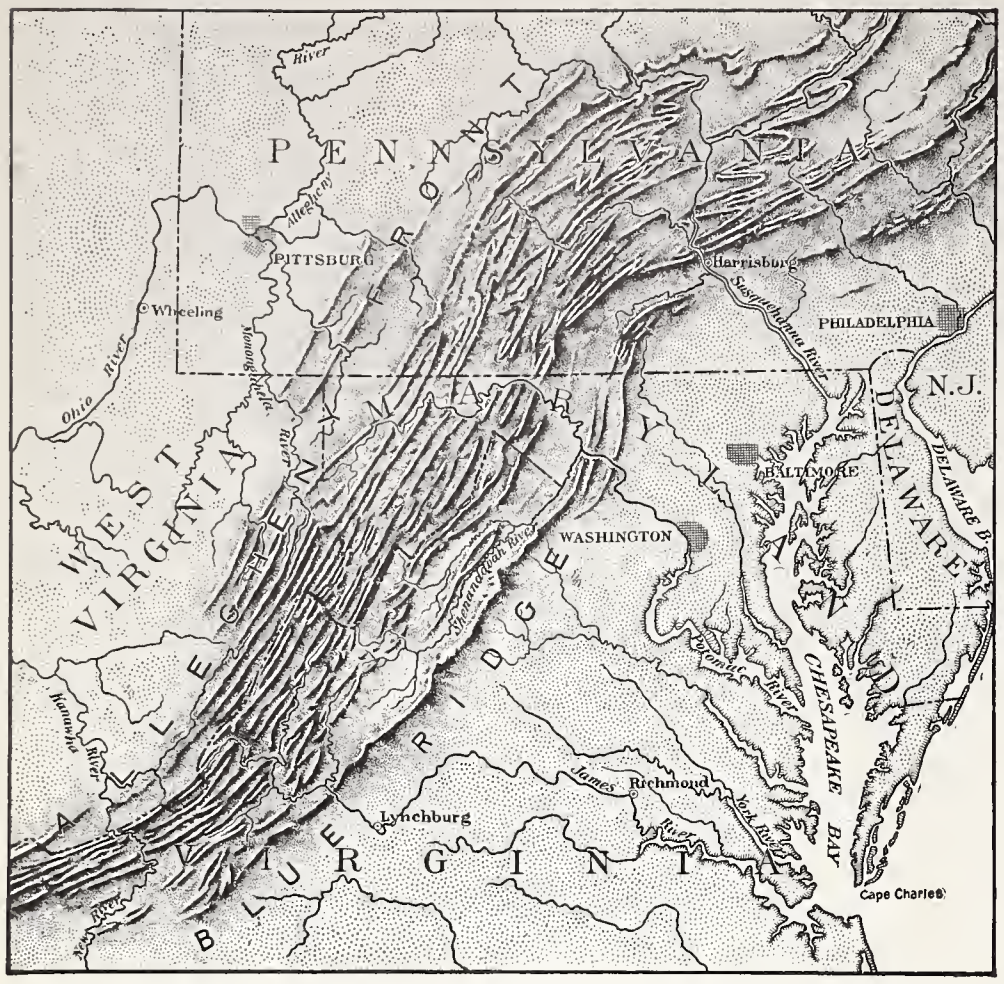
II. Southern Part. Western region: surface; drainage; formation; name. Eastern region: surface; coast — borders, indentations; drainage; formation; name. Fall line: reason for; formation; value.

THE APPALACHIAN MOUNTAINS

West of the Atlantic plain are the Appalachian Mountains (map, p. 42). These mountains are cut entirely across by the low valley which contains the Hudson River, flowing to New York Bay, and Lake Champlain, draining to the St. Lawrence River.

Northeast of this valley the mountains include a practically continuous range, which extends into Canada nearly to the Gulf of St. Lawrence (maps, pp. 42, 54). Its crest is worn into a succession of peaks and wide depressions. To the east of this range is another, less continuous, line of heights, which rises in Mount Washington to an altitude of over a mile, the greatest elevation of the northern Appalachians.

West of Lake Champlain is a low plateau from which rise the short but rugged ridges of the Adirondack Mountains.



THE NORTHERN PART OF THE APPALACHIAN RIDGE AND VALLEY BELT.

Southwest of the Hudson valley the eastern half of the Appalachian region consists of long, narrow mountain ridges, nearly parallel to one another, and separated by wide valleys. This part of the region is called the *Appalachian ridge and valley belt.* The ridges are about half a mile high, usually with smooth and even summits, but Blue Ridge, the most eastern range, has many peaks and is higher in the south. Mount Mitchell is over a mile high. The valley just west of Blue Ridge, called the "Great Valley," extends southwest from the Hudson to the Alabama River.

The western half of the Appalachian region is a broad upland, about as high as the Appalachian ridges. The streams have worn deep, narrow valleys into its surface, thus cutting it into a number of detached plateaus, called the *Allegheny plateaus.*

Trace the divide of the Atlantic slope southwestward from the source of the Hudson. It will be seen that in the north the larger streams rise west of the ridge and valley belt and flow southeast to the Atlantic, crossing the mountain ridges one after another in *water gaps.* In the south, on the contrary, the larger streams such as the Kanawha and the Tennessee rise in the eastern ridge and flow into the Ohio to the northwest. They have cut deep gorges through the whole width of the plateau to reach that river. These gorges and water gaps are of great use to commerce by affording low routes across the mountains.

Ages ago the rock layers of the eastern half of what is now the Appalachian region were upheaved into many long folds or waves (§ 31). Most of the rock layers are soft, but some of them are very hard. The erosion of ages carried away the tops of the folds (§ 32), exposing the edges of the layers, and reduced the region to a nearly flat lowland (§ 51). Then this region was again upheaved, but so slowly that the larger streams flowing across it to the sea could cut their channels across the hard layers as fast as the region rose. The branches of the larger streams, from the right and left, rapidly eroded the soft layers as the region rose, forming the long Appalachian valleys, while the hard layers in the sides of the old folds were eroded more slowly, and were thus left projecting as the parallel, even-topped Appalachian ridges (§ 32, diagram).

In the western half of the Appalachian region the rock layers are nearly level. The surface is now composed of a hard and thick layer, which weathers very slowly, and as it rose was cut through only by the narrow valleys of the larger streams; so that this region now remains as the rough upland called the Allegheny plateaus.

The northern part of the Appalachian region was once so deeply covered by the Laurentian glacier that only the highest mountain peaks projected above the ice. The glacier widened many of the valleys, rounded and softened the mountain outlines, and left that part of the region covered with drift.

TOPICS ON THE APPALACHIAN MOUNTAINS

I. NORTHERN PART. Valleys: formation; drainage — lakes, rivers, falls. Mountains: shape; position.

II. SOUTHERN PART. Western region: height; surface. Eastern region: ridges — formation, height, shape, direction; valleys — shape, formation, chief one. Drainage: northern; southern; use of river valleys.

THE CENTRAL LOWLAND

What river system drains most of the Central Lowland in the United States? (map, p. 42). What is the largest eastern tributary of the Mississippi? Name the three largest western tributaries. What is the largest system of the Gulf slope, after the Mississippi? Name several other streams of the Gulf slope west of the Mississippi system; several east of that system.

From the Allegheny plateaus the Central Lowland slopes gently downward to the Mississippi River, where a gradual ascending slope begins, extending to the foot of the Rocky Mountains, at an elevation of over a mile.

In the main the surface of this vast region is broken only by the "bluffs," or hillsides which border the broad flood plains.

North of the terminal moraine of low, gravelly hills (map, p. 42), the country is thickly covered with glacial drift and contains thousands of lakes. This region is called the *Lake plains.*

There is also a drift-covered region south of the moraine, in which most of the glacial lakes have been

DELAWARE WATER GAP.

drained or filled with sediment. The uplands of this region, and of the country to the south and west, were grassy prairies when first visited by white men. This region is called the *Prairie plains.*

Between two lines drawn from the mouth of the Ohio, southeast and southwest, most of the Central Lowland slopes directly to the Gulf of Mexico. This region is called the *Gulf plain.* Toward the coast it is much like the Tidewater region. Through the center the mighty Mississippi meanders in a great flood plain from twenty-five to seventy miles wide (§§ 52–54).

This flood plain is one of the most fertile regions in the world, and contains many farms or plantations. As it is lower than high water in the river, embankments, or *levees,* have been built along the river banks to prevent overflows. During high water a break, or *crevasse,* sometimes occurs, and then the country far and wide is covered with water. At its mouth the river has formed a great delta (§ 57), which projects far into the Gulf beyond the even curve of its shore line.

The most rugged part of the Central Lowland is the Ozark Mountains. The Arkansas River divides these mountains into two parts. North of the river the land consists of rugged plateaus. South of it, the rocks have been folded and eroded into ranges of hills and low mountains, somewhat like the Appalachians.

A Levee on the Lower Mississippi River.

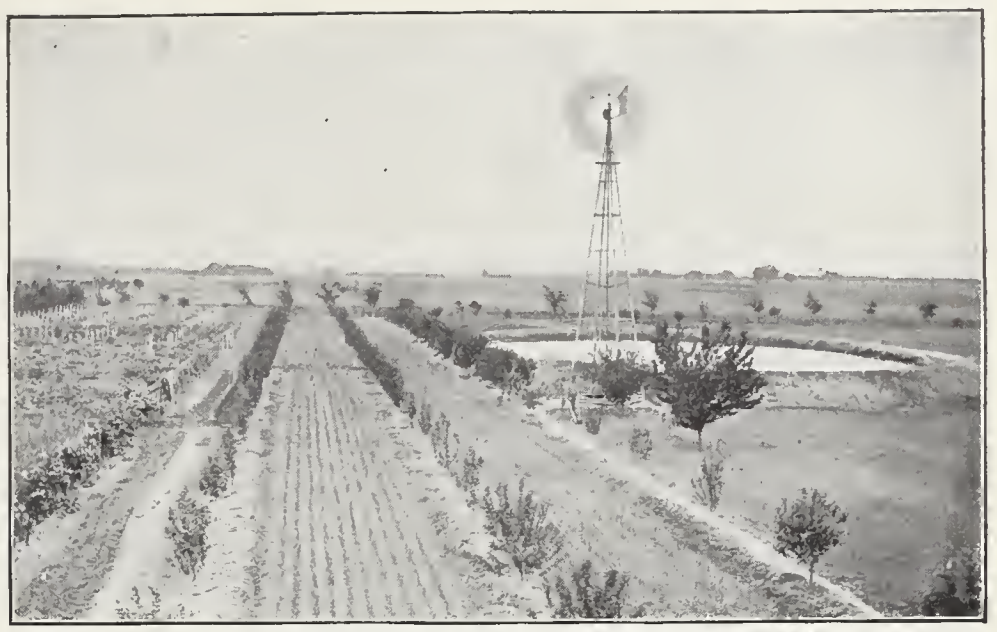
TOPICS ON THE CENTRAL LOWLAND

I. Slopes. Eastern. Western. Northern. Southern.
II. Rivers. Chief : basin ; divides ; branches ; banks ; mouth. Other rivers.
III. Regions. Lake plains : southern boundary ; surface ; covering. Prairie plains : limits ; covering. Gulf plain : drainage ; covering ; coast. Mountains : position ; northern part ; southern part.

THE ROCKY MOUNTAIN HIGHLAND

From the map, p. 42, trace across the United States the boundary between the Central Lowland and the Rocky Mountain highland. Compare by measurement along the 40th parallel the distances from this boundary to the Atlantic and to the Pacific coast.

Near the center of the United States the Central Lowland merges into the highland which covers most of the western half of the country. This vast Rocky Mountain highland may be roughly divided into four



The Prairie Plains, Eastern Kansas.

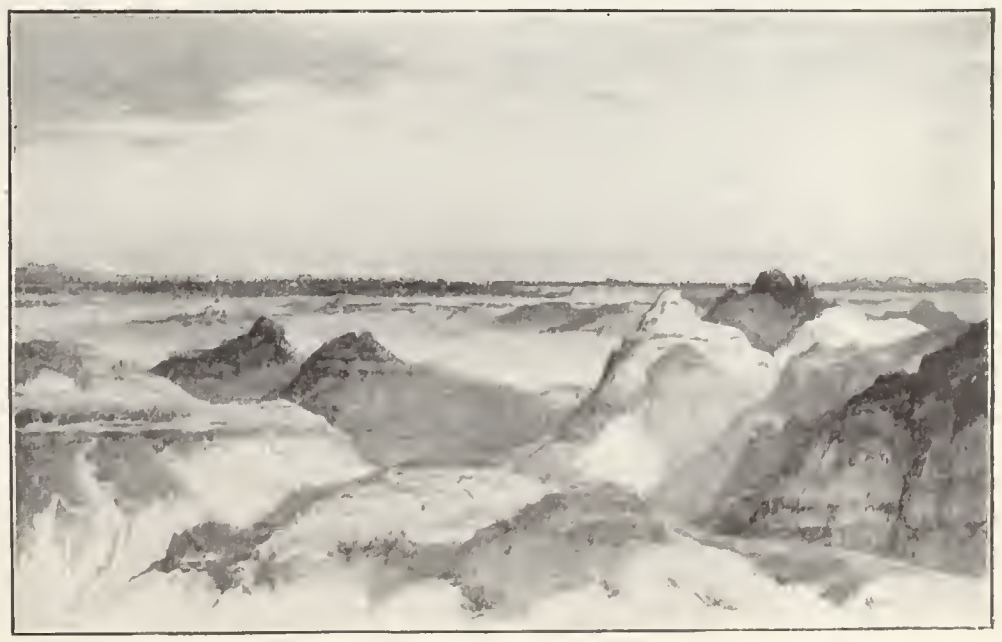
sections extending in a general north and south direction across the country: (1) the Great Plains on the east, (2) the high ranges of the Rocky Mountain chain, (3) the great plateau and basin region, and (4) the high Sierra Nevada and Cascade ranges along the western border of the highland.

As the prevailing winds from the Pacific lose most of their moisture on the west slopes of the Sierra Nevada and Cascade ranges, the highland region in general is dry, and in some parts is a desert (§ 91). The larger streams of this region are maintained by the rains and melting snow of the mountain ranges. Many of the smaller streams flow only after the occasional brief and heavy rains, or "cloud-bursts."

The *Great Plains* in general appear nearly level. Really their surface is a gradual slope upward from the Central Lowland to the base of the Rocky Mountains.

The larger streams flowing across the Great Plains are kept so choked with the sand brought in by their tributaries, that the valleys are widened faster than they are deepened, and are therefore generally broad and shallow. In some places toward the north, however, the soft rock has been worn into a maze of deep gullies, forming the "*Bad Lands.*"

The *Rocky Mountains* border the Great Plains on the west. The surface at the base of these mountains is nearly $1\frac{1}{4}$ miles high; the ranges themselves rise between one and two miles higher. The lower slopes



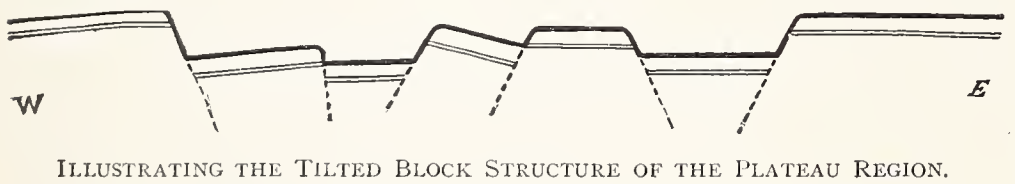
"Bad Lands," South Dakota.

ROCKY MOUNTAINS, MONTANA.

are forest-clad; the jagged crests are bare rocks except when covered with snow.

From South Pass (see map, p. 42) northward the ranges are irregular in direction. Some are the remnants of rock folds, some are upheaved and tilted blocks of rock, and others are formed of old lava outflows (§ 33). South of the pass the ranges are more nearly parallel. As a rule, each range is a single broad rock fold, from which the top layers have been worn away, thus exposing the hard granite rock which now forms the higher, central part of the range. Between the ranges are wide, grass-carpeted valleys, or "parks."

The *plateau region* west of the Rocky Mountains, when upheaved, was broken into great blocks, many miles in length. Some of them were lifted higher than others, forming higher plateaus separated from the lower plateau surface by lines of cliffs. Other blocks were tilted so that the upturned edges form ranges of mountains. In this region, too, the streams have cut the deepest canyons in the world. Thus the surface of the plateau region is very uneven.



ILLUSTRATING THE TILTED BLOCK STRUCTURE OF THE PLATEAU REGION.

After the upheaval of the *Columbia plateaus*, lava, forcing its way up through the fissures, spread over the surface (§ 33). Repeated outflows, meeting and overlapping, covered nearly the whole region with lava to a great depth, completely burying many of the upheaved and tilted rocks. Into this vast lava plateau Snake River has cut a narrow canyon which is in some places three fourths of a mile deep.

The *Colorado plateau* region is divided into many plateaus, some high, some low, separated by long lines of cliffs along the sides of the upheaved blocks. The region is remarkable for the deep, narrow canyons cut by the streams. These streams have been flowing in their present channels throughout much of the period of upheaval, and have deepened their channels about as fast as the surrounding country rose, and much faster than weathering could widen the valleys in that dry region (§ 50). Hence the channels have become narrow and impassable canyons, in some places over a mile deep.

The *Great Basin* lies between the Wasatch Mountains and the Sierra Nevada, and extends south to the Gulf of California. It is the driest part of the United States, and has few permanent streams. The uptilted edges of the blocks in this region have been eroded into numerous low mountain ranges. Between these are broad, level plains formed of the rock waste from the mountains. During the season of rainfall, shallow lakes form in many of these valleys; but during the dry season they evaporate, leaving their beds incrusted with salt.

About the time that the Laurentian glacier covered the eastern part of North America (§ 60), extensive lakes covered much of the Great Basin. Gradually the climate became drier, and the lakes became smaller. Great Salt Lake and a few smaller lakes are remnants of these old inland seas. Around the edges of the basin are now found several nearly level terraces which mark different heights of these old great lakes as evaporation gradually lowered their surface.

OLD LAKE TERRACES, UTAH.

The *Sierra Nevada and Cascade Mountains* are from one to two miles higher than the general surface of the plateau.

The Sierra Nevada is an enormous block of rock uptilted along its eastern edge, so that its surface slopes to the west. The dry eastern side is short and steep. The streams upon the long, well-watered western slope have cut deep canyons, leaving a succession of long mountain spurs between.

There were outflows of lava in the Sierra Nevada, but in the Cascade Mountains the outflows were so great that the tilted blocks generally are buried, and the mountains seem to be composed entirely of lava. All the principal peaks are volcanoes, some of which are probably not yet extinct. Mount Rainier, the highest, is nearly three miles high, and several of the others are high enough to be always capped with snow.

TOPICS ON THE ROCKY MOUNTAIN HIGHLAND

I. PLAINS AND PLATEAUS. Eastern: surface; river valleys — south, north. Western: northern part — formation, valley; central part — limits, surface, drainage; southern part — surface, valleys, formation.

II. MOUNTAINS. Eastern: northern part — appearance, formation; southern part — ranges, valleys. Western: southern range — formation, slopes, streams; northern range — formation, peaks.

III. CLIMATE. Regions: western; eastern; mountain ranges; Great Basin; lakes. Effect: on surface; on vegetation.

THE PACIFIC COAST REGION

What low mountains closely border the Pacific coast? What mountainous island lies at the northern end of these ranges? By what strait is it separated from them?

The narrow Pacific coast region consists of a series of low mountains which rise abruptly from the coast, and a series of broad lowland valleys which separate the coast ranges from the Sierra Nevada and the Cascade Mountains.

The *Coast Ranges* are the remains of wide rock folds. While they were being elevated they were a chain of mountainous islands, like Vancouver Island, or high peninsulas, like Lower California, and like them were bordered on the east by long narrow gulfs or sounds.

Continued elevation has brought the bottoms of these gulfs slightly above the level of the sea, forming the great *lowland valleys* of the region.

These valleys have been rendered very fertile by the fine rock waste washed into them from the bordering mountains. The California valley drains into the ocean through San Francisco Bay, which was once a strait like the present Strait of Juan de Fuca. In the north the valley is still occupied by the island-studded arm of the sea called Puget Sound.

In comparison with the Appalachians, the western highlands are very young; the mountains are among the youngest in the world. Their upheaval has occupied thousands of years, but is not yet completed. The region is still subject to earthquakes, caused by slight movements of the great blocks into which the region is broken, and some of its volcanoes still show occasional signs of activity.

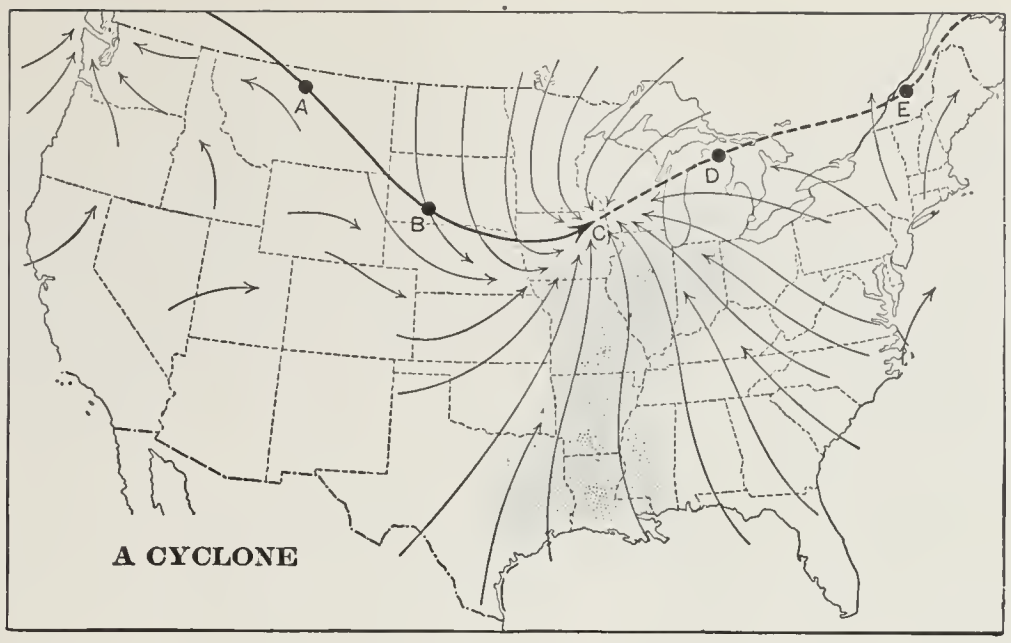
TOPICS ON THE PACIFIC COAST REGION

I. RANGES. Position. Extent. Height. Formation.
II. VALLEYS. Formation. Divisions. Drainage. Soil.

CLIMATE

The United States lies chiefly in the warmer part of the temperate zone. In summer most of the country is within the hot belt, but in winter a large part of it lies within the cold belt (§ 82), as shown on this chart (see also p. 38). As regards summer and winter temperature, there are four climatic belts or regions in the United States, as represented on the chart.

The difference in temperature between the northern and the southern part of the country is much greater in winter than in summer — the northern winters being much longer and colder than those in the south.



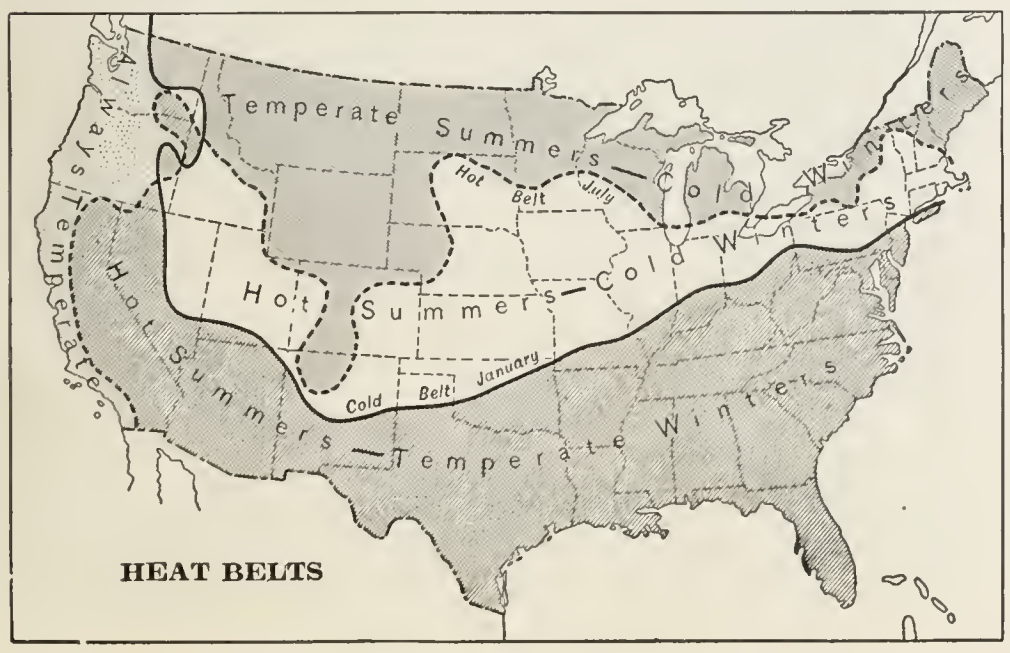
A CYCLONE

East of the Rocky Mountains, especially in the north, the weather is subject to rapid changes at all seasons. These are caused by the cyclonic storms (§ 86) which are always drifting eastward over the country.

A cyclonic storm is illustrated by the chart at the top of the page. The point of the heavy arrow lies in a storm center, around and into which the winds are whirling, as shown by the light arrows. East of the center the winds come from the south and southeast and make the weather warm. West of the center the winds come from northward and make the weather cool.

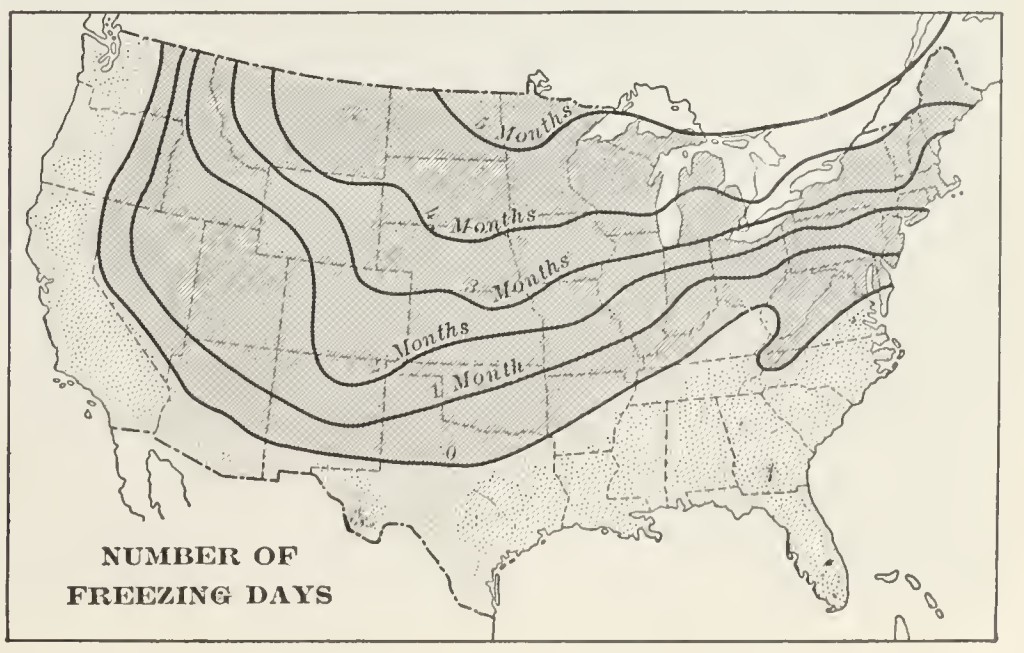
But the storm center is moving all the time. Twenty-four hours before it reached *C* it was at *B*; and a day's drifting from *C* will *probably* carry it to the neighborhood of *D*. Thus, as the storm drifts rapidly eastward over the country, it carries warmer weather in front of it, and is followed by colder weather.

In the eastern half of the country the southerly winds in front of the cyclone are vapor-laden when they leave the Gulf of Mexico, but are chilled as they advance northward; hence cloudy, rainy, or snowy weather sweeps over the country in front of the cyclone. When

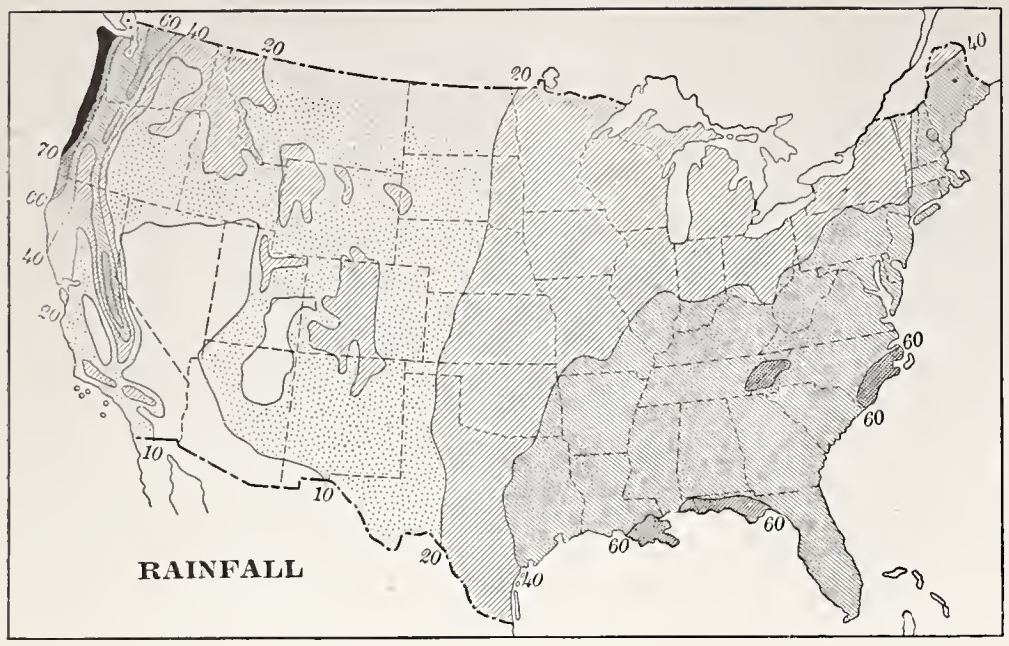


HEAT BELTS

In the right-hand chart below, the dotted region has no day in the year whose average temperature is below freezing. The number of freezing days in a year increases northwardly over the region shown by the shaded portion of the chart, the first line showing where there are thirty days of freezing weather, the second line sixty days, and so on.



NUMBER OF FREEZING DAYS

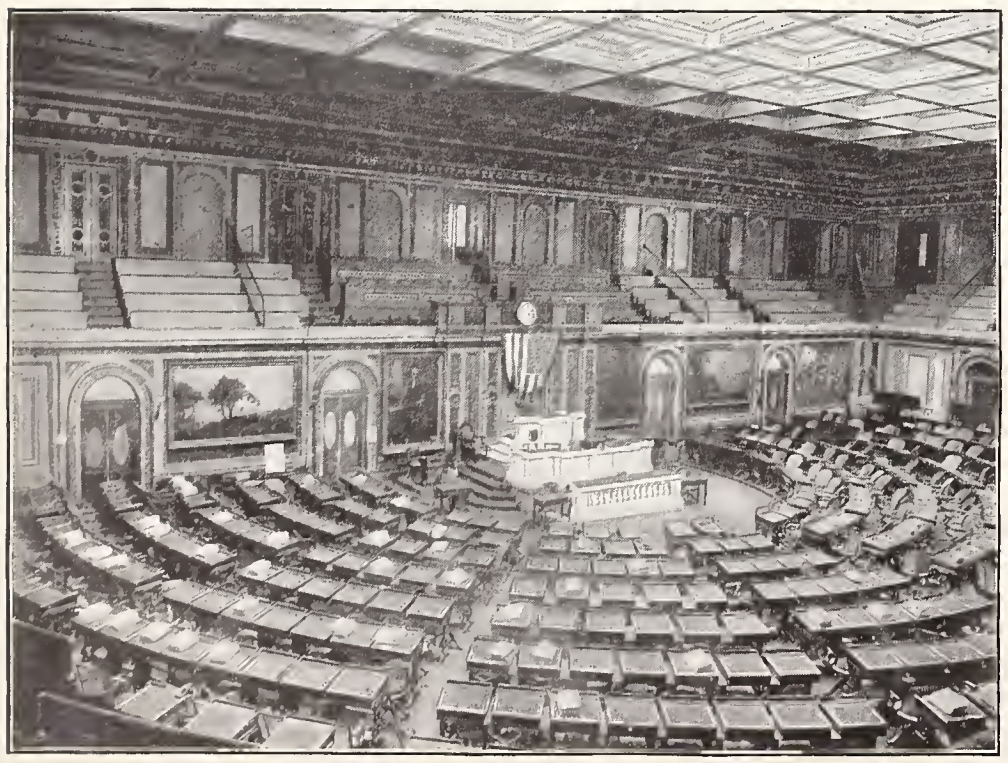


the storm center is far west of the Gulf, however, the southerly winds in front of it come from dry highlands and give but little rain to the western half of the United States. The winds on the western side of the storm center grow warmer as they advance southward, and hence (§ 89) bring clear, dry weather.

In the chart above, the regions shaded by lines would each year be covered more than twenty inches deep by the rainfall, if the water remained where it fell. This amount is ample for almost all kinds of farming. In the parts of the United States shown by dots, or left unshaded, the rainfall is less than twenty inches, and as a rule irrigation is necessary for farming. Explain why the Pacific coast region has a heavier rainfall (p. 46).

Cyclones follow one another so rapidly that there are almost always one or more storm centers in the United States. The observers of the United States Weather Bureau take daily observations of the weather in different parts of the country, by which they are able to locate the existing storm centers, and by judging in what direction, and how far, the cyclone, with its warm wave, cold wave, and rain and cloud regions, will advance during the next twenty-four hours, they are able to determine the "weather probabilities" for the following day.

Supplemental Work. Read chapter 11, on Weather and Weather Predictions, in Waldo's "Elementary Meteorology."



HOUSE OF REPRESENTATIVES, WASHINGTON, D.C.

GOVERNMENT

When the thirteen English colonies became independent (p. 41), each formed a *state government*, which deals with local matters only. But the thirteen states united to form a single republic (§ 125) under a *Federal government*, which deals with matters of interest to more than one state.

The land between the Appalachian Mountains and the Mississippi River was then unsettled. Most of it was given up to the Federal government, and, with most of the region afterward acquired by the United States west of the Mississippi River, was known as *public land*. The Federal government divided this public land into great tracts called *territories*. When enough people had settled in a territory, it was admitted to the Union as a state. There are now forty-six states and the territories of Arizona and New Mexico in the main body of the country, besides outlying territories and dependencies.

The Federal Government has three great branches. These are (1) a law-making, or *legislative*, branch, called *Congress*, to which each state sends one or more representatives and two senators, chosen directly or indirectly by the people of the state; (2) a law-enforcing, or *executive*, branch, at the head of which is the *President*, who is elected every four years; (3) a law-explaining, or *judicial*, branch, consisting of *Federal courts* presided over by judges who are appointed for life.

Congress meets, the Supreme Court has its sessions, and the President lives in Washington city, which is therefore the capital of the United States. Congress and the Supreme Court meet in the Capitol. The residence of the President is called the White House.

The executive branch of the government is divided into nine great departments, the heads of which are the President's chief advisers, and form his *Cabinet*. The Secretary of State has charge of our foreign ministers and consuls and all the government's business with foreign countries. The Secretary of the Treasury controls the collection, payment, and coinage of money for the government. The Secretaries of

WHITE HOUSE, WASHINGTON, D.C.

CAPITOL AT WASHINGTON.

War and the Navy control the army and the navy. The Attorney-General is the government's chief lawyer. The Postmaster-General controls the post offices of the country, the carrying of the mails, and the manufacture and sale of postage stamps. The Secretary of the Interior has charge of the surveying and sale of the public lands, of pensions, of patents, and of Indian affairs. The Secretary of Agriculture has charge of the Weather Bureau, and collects and publishes information about the crops, domestic animals, and forests, and the conditions favorable or unfavorable to them. The Secretary of Commerce and Labor collects and publishes information about fisheries, mines, manufacture, commerce, and labor, and has charge of the lighthouses.

The State Governments are similar to the Federal government. Each has a law-making branch, usually called a *legislature*, composed of senators and representatives; a law-enforcing branch, composed of a *governor* and his assistants; and a law-explaining branch, consisting of the *state courts*, presided over by judges. These officers are generally elected by the people of the state, though in some states the judges are appointed.

The Territories and Dependencies are controlled by Congress. The people of a territory are allowed to elect their own legislature, but the governor and judges and other officers are appointed by the President, and Congress may set aside laws made by the territorial legislature. Each territory sends to Congress a delegate who may speak, but has no vote.

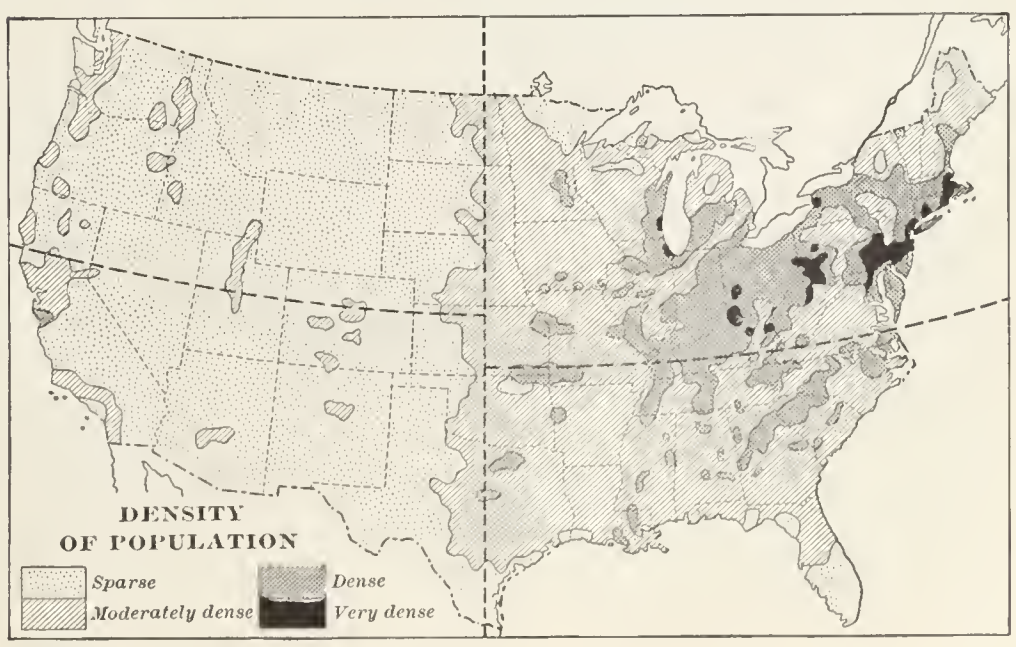
Supplemental Work. Count the number of stripes and of stars in our flag. What do they represent? Find the names of the present President and his Cabinet. Read chapters 2, 3, and 4, "Carpenter's Geographical Reader, North America."

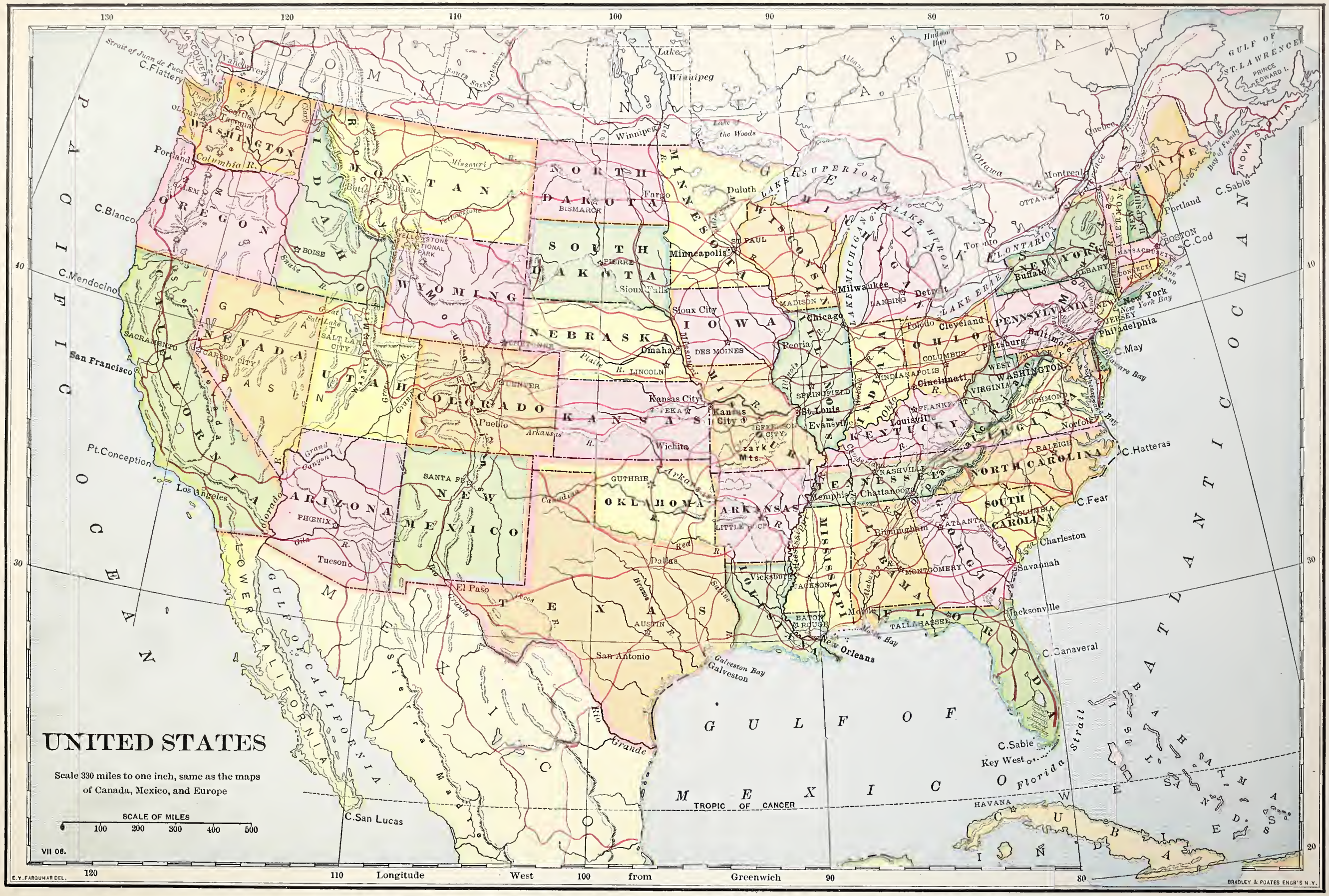
POPULATION AND PROGRESS

Population. On this population map the United States has been roughly divided into quarters by heavy broken lines. It will be seen that the northeastern quarter is more densely peopled than the southeastern, and that the two eastern quarters have a denser population than the two western quarters with their drier climate (pp. 41, 48). The eastern half of the United States contains nearly nine tenths of the people in the country.

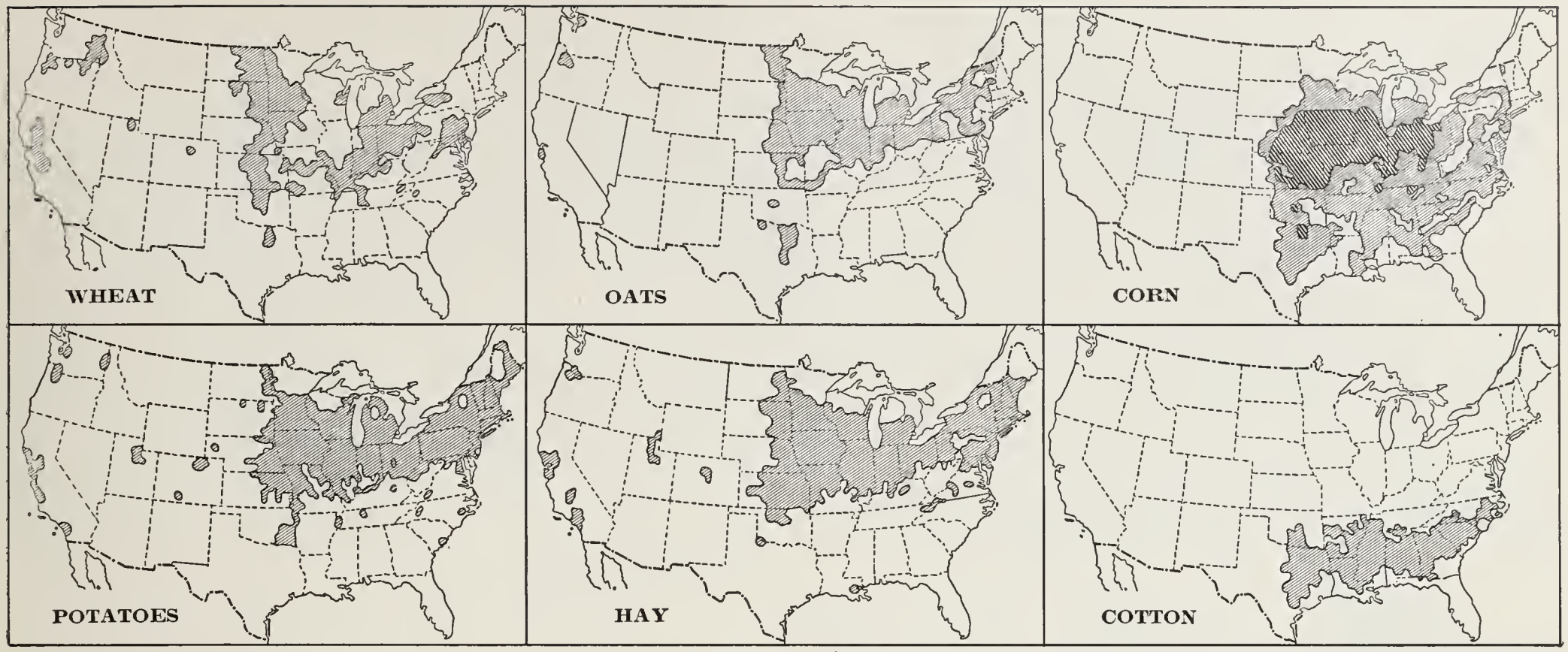
At the end of the Revolutionary War there were about four million people in the United States, mostly near the Atlantic coast. Now the population is twenty times as great and has spread over nearly the whole country. This represents a greater increase and more rapid spread of population than has ever been known before in the history of the world. Millions of people, attracted by the cheap and fertile lands and the great opportunities under a free government, have left their homes in Europe to settle in the United States, and thousands of others are coming every year.

People have come from all countries, but mostly from Great Britain, Ireland, Germany, Italy, and the Scandinavian countries. Whatever their nationality, however, they soon adopt our language, manners, and customs, and become thorough *Americans*.





Map Exercise. Name and locate six states lying entirely east of the Hudson River. Name and locate seven states between the Hudson River and Chesapeake Bay which are bordered by the Atlantic or crossed by the Appalachian Mountains. Name and locate six states between these and the Mississippi River. Which of them border on the Great Lakes? Which of them border on the Ohio River? Name and locate seven northern states between the Mississippi River and the Great Plains. Name and locate seven southern states lying entirely east of the Mississippi River. Which of them border on the Atlantic? Which border on the Gulf of Mexico? Which one has no coast? Name and locate four southern states between the Mississippi River and the Great Plains. Name and locate three states and one territory which are crossed by the Rocky Mountains. Name and locate three states and one territory lying on the great plateaus west of the Rocky Mountains. Name and locate three states which border on the Pacific.



Most of the immigrants have landed in the northeast, and moved inland, seeking work and homes. Hence the northeastern quarter of the country is most densely settled, and has the largest foreign population.

In the southeastern quarter there are not many foreigners, but there are about as many negroes in that region as there are foreigners farther north.

In the thinly settled region of the west there are some Indians, but there are many more whites than Indians.

On the Pacific coast there is a large foreign population, mainly Europeans, but about one eighth of the foreigners are Chinese.

Progress. Although the United States is one of the youngest of nations, it is one of the greatest. It has an enormous territory, and a highly civilized and energetic people, all speaking the same language.

Industries of all kinds have increased in this country even more rapidly than the population. Not only is the total product of *all* the seven chief industries pursued by man (§ 127) greater in this country than in any other, but the product of *each* of these industries is greater than in any other nation.

Many articles are produced in such large quantities that there is sufficient to supply the wants of the great population and to leave a surplus for export to other countries where the article is needed. Thus the people of nearly every country in the world have come to rely upon the workmen of the United States for some of the necessaries of life.

Supplemental Work. Read chapters 1, 4, and 15 in "Children's Stories of American Progress," by Henrietta Christian Wright.

Before taking the following lessons devote several days to the study of the map on the opposite page, until you can name or locate without hesitation any state or territory on the little production maps above.

PRODUCTION

Agriculture is confined mainly to the eastern half of the country and to the Pacific coast region, where the annual rainfall exceeds twenty inches (p. 48). More of our people are engaged in farming than in any other occupation. Corn, hay, cotton, wheat, oats, and potatoes are the principal crops, and they comprise more than three fourths of the value of all the agricultural productions.

Practically all the cotton is produced in the southeastern quarter of the country, but the other five great crops are produced chiefly in the northeastern quarter, as shown on the production maps above.

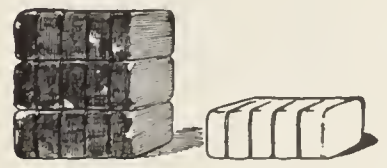
THE WORLD'S CORN CROP.

Corn is much the largest and most valuable crop. It is chiefly fed to live stock, though great quantities are used for human food, and for distilling into spirits. Corn is the only great crop that is widely grown both north and south, but the chief corn belt lies in the northern Mississippi valley. The diagram shows the proportion of the world's corn crop raised in the United States.

Wheat, used chiefly as food for man, is one of our most important crops. It does not require as hot summers as corn, and hence thrives farther north. The diagram shows the proportion of the world's wheat crop raised in this country.

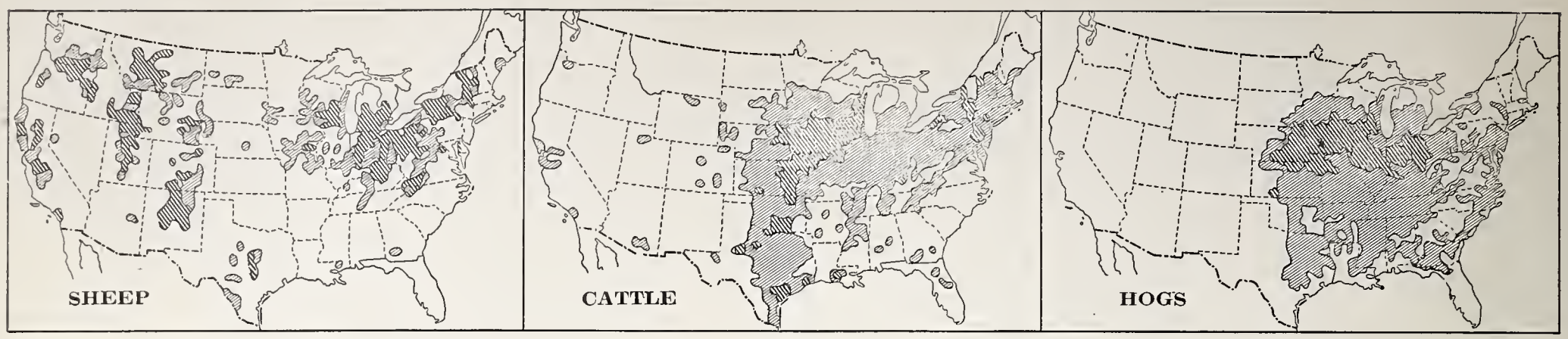
THE WORLD'S WHEAT CROP.

Cotton is a peculiarly important crop. More cloth is made from cotton than from any other material, and the bulk of the world's cotton supply comes from the United States (see diagram).

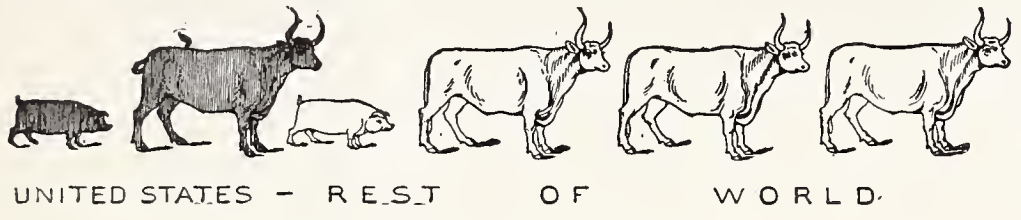


THE WORLD'S COTTON CROP.

The minor agricultural products of the United States are very numerous, and many of them are quite important, as fruits, vegetables, tobacco, barley, and sugar cane.



Herding. Nearly half of the hogs and about one fourth of the cattle in the world are raised in the United States. From them is obtained so large a surplus of pork and beef that, after cotton, meat is our greatest export. Horses and sheep are raised in great numbers, but scarcely in excess of our own wants.



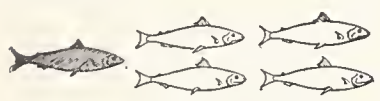
THE WORLD'S PRODUCT OF CATTLE AND HOGS.

As shown on the maps above, the distribution of hogs conforms closely to the corn region, while the area of cattle conforms more nearly to the hay region, with a broad southwestward extension over the grassy plains of Texas to the Gulf coast.

Most of the horses are raised in the oat-producing region, though some localities not in this region are noted for horse-breeding.

Sheep, while used for mutton, are chiefly valuable for their yield of wool. Fleeces grow thickest in a rather cool climate, hence the great sheep ranges are in the northern part of the eastern lowland, in the western highlands, and on the Pacific coast.

Fishing. The fish product of the United States is more valuable than that of any other nation. The diagram shows the proportion of the world's catch obtained by our fishermen. Oysters and codfish from the northeast coast and salmon from the northwest coast are the most important products.

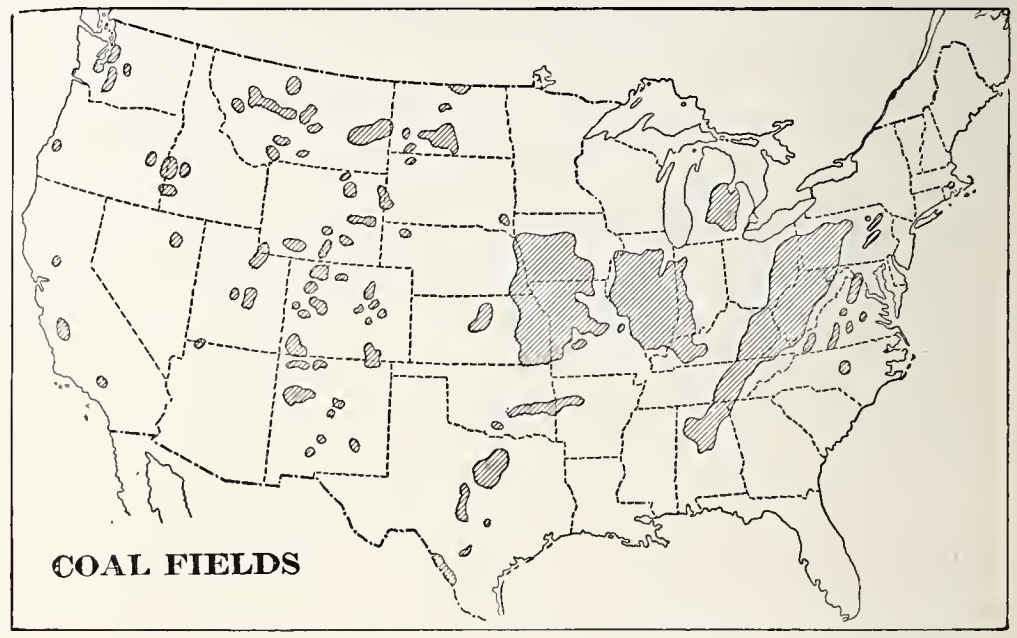


FISHERIES OF THE WORLD.

Lumbering. Fully one third of the timber cut in the world each year comes from the forests of the United States. Lumber, in the shape of logs, beams, boards, and shingles, forms one of our important exports. The map shows the regions which contain the most continuous forest areas. The densest forests are those near the Pacific coast.

LUMBERING OF THE WORLD.

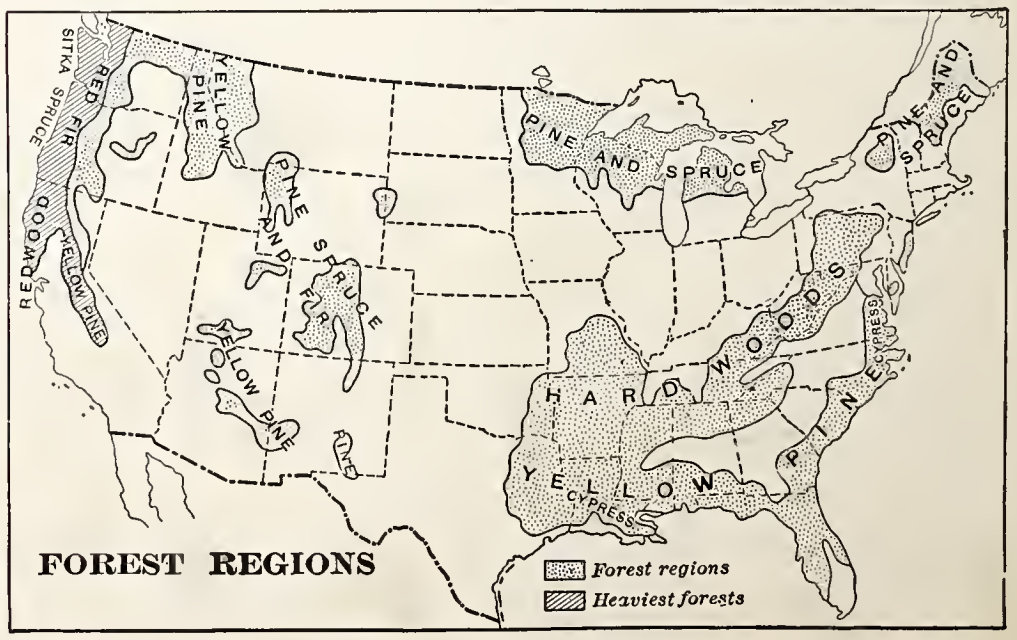
Mining. The mines of the United States are among its most valuable resources, and yield about one third of the mineral product of the world. By far the most valuable of the mineral productions are coal and iron; then follow in value petroleum, copper, gold, and silver. The yield of each of these is enormous. The petroleum and copper amount to more than half of the world's supply, and these two minerals, together with coal, are important articles of export.

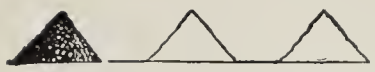


Coal is mined mostly in three extensive fields in the eastern half of the country. Three fourths of our coal comes from the large eastern field and the small detached fields northeast of it; most of the remainder comes from the large middle and western fields.

THE WORLD'S OUTPUT OF COAL.

Iron ore is found in nearly every state, but about two thirds of our product is mined near the south and west



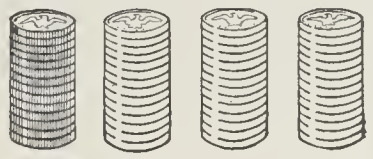


THE WORLD'S OUTPUT OF IRON ORE.

shores of Lake Superior, and most of the rest is mined in the worn-down rock folds of the Appalachian ridges.

Petroleum is widely distributed, but the chief sources of supply occur (1) near the northwestern part of the great eastern coal field; (2) near the western edge of the large western coal field; (3) near the Gulf of Mexico; and (4) in the extreme southwest.

Gold and *silver* are mined chiefly in the Rocky Mountains and the Sierra Nevada, while by far the greater part of the *copper* comes from two small clusters of mines, one near the south shore of Lake Superior and the other near the source of the Missouri River.



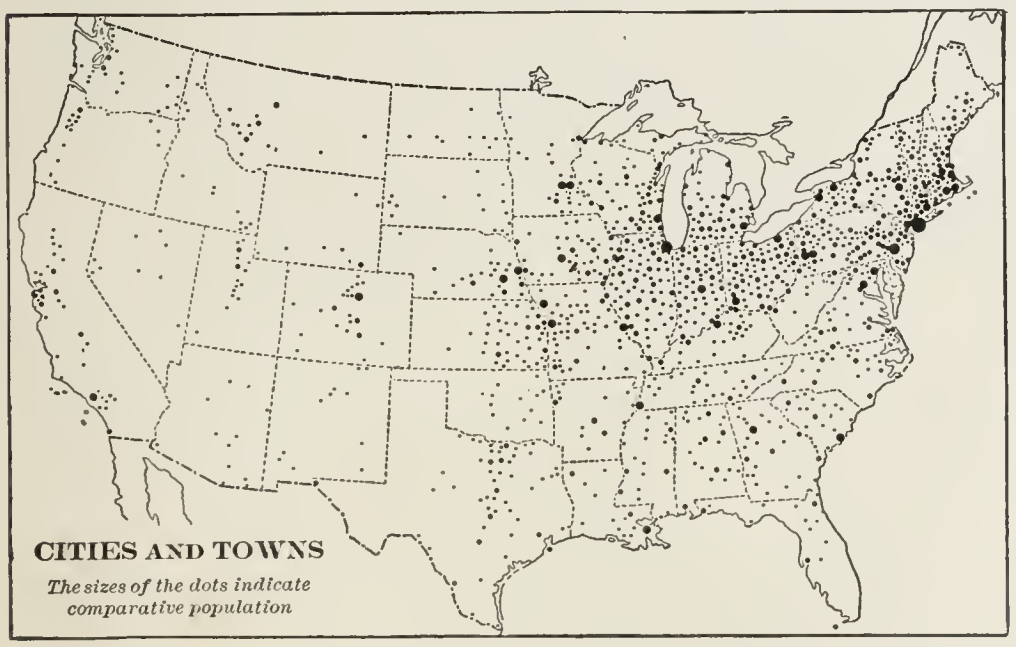
THE WORLD'S OUTPUT OF GOLD AND SILVER.

MANUFACTURING AND COMMERCE

Manufacturing The United States is the greatest manufacturing country in the world. Nearly every kind of article wanted by civilized man is manufactured in our country, and nearly always more cheaply here than anywhere else. The greatest manufactures are iron and steel goods, packed meats, cloth and clothing, lumber, flour and corn meal, liquors, shoes and leather goods.

THE WORLD'S MANUFACTURES.

Manufacturing is carried on chiefly in cities and towns. On this map the cities and towns of the United States



are shown by dots, the larger dots standing for the larger manufacturing centers. About nine tenths of the manufacturing is done in the northeastern quarter of the country. In the extreme northeast, where the towns are very numerous, this industry is particularly active.

In the northeast, cloth, boots and shoes, clothing, fine machinery, books and paper, are leading products. West of the Appalachian Mountains lie the great coal fields, while the greatest iron ore beds lie near Lake Superior. To smelt the iron from the ore, much fuel is necessary, and as the ore can be transported cheaply by water, the regions where the great coal fields approach the Great Lakes have become the most important centers of the iron and steel industry. Meat packing and the manufacture of flour, liquors made from grain, and lumber are also carried on chiefly west of the Appalachian Mountains, in the region where the raw material is produced.

Commerce. The collection of raw materials from the various parts of the United States at the points of manufacture or export, the distribution of the manufactured products, and the importation and distribution of goods not produced in the country give rise to a commerce greater than that of any two other nations in the world.

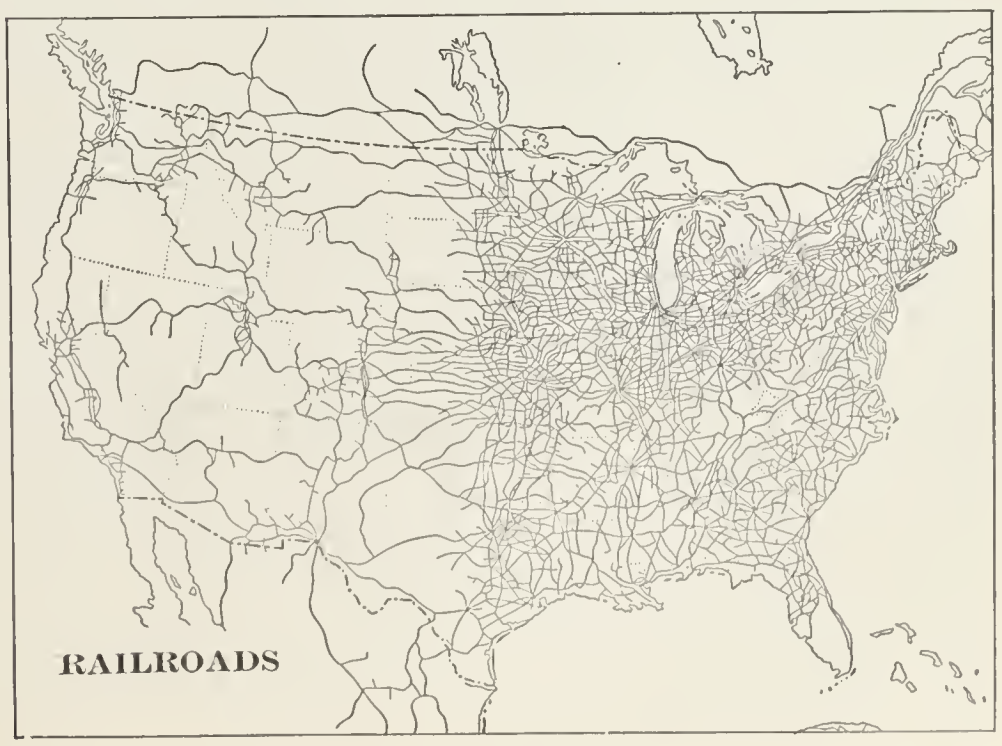
THE WORLD'S COMMERCE.

Although our *foreign* commerce is exceeded by that of only one or two other countries, it forms but one tenth of our *total* commerce. Considerably more than half of our exports consist of raw cotton, meat and breadstuffs, iron and steel manufactures, and kerosene.

Our chief imports are raw fibers (silk, wool, etc.), cloth, sugar, and coffee. Among other imports are drugs and chemicals, hides, and India rubber.

Fully three fourths of the merchandise which enters into the commerce of this country is transported by railroad, and but one fourth by boats on the oceans and lakes which border the country, or on the rivers and canals which traverse it. Nearly half of the world's length of railroad is in the United States How does the distribution of railroads compare with the distribution of population? (map, p. 49.) Commerce is greatest in the quarter of the country where there are most railroads and the densest population.

Supplemental Work. Read chapters 5, 10, and 12 in Wright's "Children's Stories of American Progress." Read sections 280 to 286 and chapter 22 of McMaster's "School History of the United States."



NORTHEASTERN SECTION

Scale 45 miles to one inch, three times the scale of other sectional maps of the United States

SCALE OF MILES

0 10 20 30 40 50 60 70 80 90 100

The highlands above 2000 feet are shown in the buff tints, the lowlands in the green tints.

BOSTON AND VICINITY

Scale, 10 miles to one inch

Longitude West from Greenwich

BRADLEY & POATES ENGR'S N.Y.

COMMERCIAL AND INDUSTRIAL SUBDIVISIONS

Review the lesson on longitude and study the supplemental work (p. 7). In about what longitude is Philadelphia in Pennsylvania? (See map below.) New Orleans in Louisiana? Denver in Colorado? Santa Barbara on the Pacific coast? When it is noon at Philadelphia what time is it at New Orleans; at Denver; at Santa Barbara?

Standard Time Belts. The main body of our country is so broad from east to west that more than three hours are required for rotation to carry it past the sun. When it is noon at Philadelphia, it is an hour before noon at New Orleans; two hours before noon at Denver; and three hours before noon at Santa Barbara. Hence, if we are told that a railroad train starts "at noon," we can not be sure of its time of starting, because it is noon at different places in the country for more than three hours after noon occurs on the Atlantic coast.

There is a difference of one hour in standard time between each two adjacent "standard time belts"; hence a traveler whose watch marks railroad time in one part of the country can easily tell from it the correct railroad time in any other part by adding or subtracting the proper number of full hours.

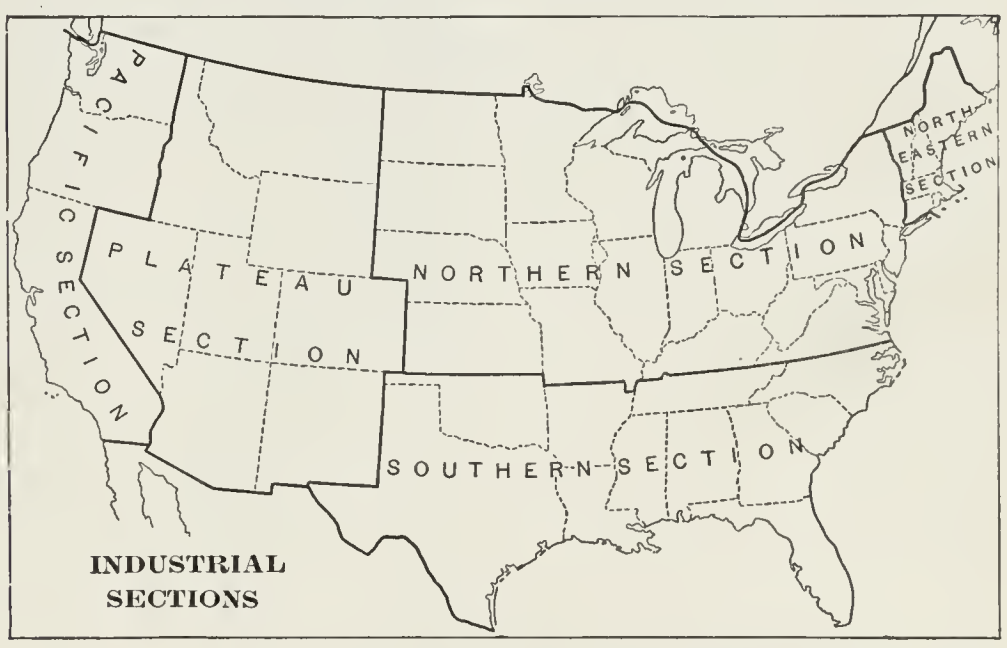
Each railroad makes the change of standard time at some station where the locomotives and train crews are changed; and as such stations on different roads are seldom on the same meridian, the edges of the time belts are irregular. In the extreme southwest, Mountain time is not used, but a change is made from Central time directly to Pacific time. What is the amount of this change?

International Date Line. Suppose that two men, starting from the prime meridian on Monday noon, travel the one eastward and the other westward, each traveling just as fast as the earth rotates. The man who goes west keeps exactly beneath the sun all the time, and it seems to him to be still Monday noon when he reaches his starting point again twenty-four hours later. He has *lost* a day in his reckoning by traveling westward around the earth.

The other man travels eastward over the earth as fast as the earth itself turns eastward, and therefore he moves away from the sun twice as fast as the prime meridian does. He therefore gains a day in his reckoning by traveling eastward around the earth.

To correct such errors in their dates, navigators usually add a day to their reckoning when they sail westward across the meridian of 180°, and subtract a day when they cross it to the eastward, and so the meridian of 180° is sometimes called the *International date line*.

Industrial Sections. We have seen that, owing largely to differences in relief, climate, and soil, the great productions of our country are confined more or less definitely to different regions. Hence the United States may be naturally separated into (1) the Northeastern, or cloth-manufacturing section; (2) the Northern, or food-, iron-, and coal-producing and manufacturing section; (3) the Southern, or cotton-producing section; (4) the Plateau, or grazing and gold- and silver-mining section; and (5) the Pacific, or Western food- and gold-producing section.



TOPICS ON RESOURCES AND PEOPLE

I. PEOPLE. Races: whites, negroes, Indians, Chinese,— distribution of each. Population: increase; distribution. Government: origin; Federal; state; territorial.

II. ADVANTAGES. Soil: alluvial; glacial. Climate: heat regions— northern, central, southern, western; length of winters; rainfall regions; influence of cyclones. Manufacturing facilities: streams; minerals. Transportation facilities: railroads; rivers.

III. PRODUCTS. Food: vegetable — regions, amount, kinds; animal — kinds, regions, amount; manufactures. Fibers: vegetable; animal; manufactures from. Timber: regions; amount. Minerals: regions; kinds; amounts.

IV. EXPORTS. Natural products. Manufactured products.

THE NORTHEASTERN SECTION

What states compose this section? What large river basin is north and what waters south and east of it? How does the distance of the section from the equator compare with its distance from the north pole? Locate the Green Mountains; the Berkshire Hills; the White Mountains; Mount Katahdin. Locate the chief lakes. Name the chief rivers, and locate their sources, courses, and mouths.

The six states in the extreme northeastern part of our country are often called New England. The surface in general is hilly, while the northwestern part of the section is traversed by the northern ranges of the Appa-

LUMBERING, MAINE.

lachians. Of these the Green Mountains are the most continuous, and the White Mountains, east of Connecticut River, are the highest.

The section is less suited to agriculture than any other part of the eastern lowlands. The valleys of the larger rivers are fertile, but over much of the uplands the soil is thin, unproductive, and covered with glacial bowlders. In the northern part are extensive forests. Such crops as hay, apples, potatoes, and tobacco are raised in the valleys. Market gardening and dairying are carried on. The greater part of the food used by the people, however, comes from the West.

The numerous waterfalls of this section (p. 43) afford excellent water power, and manufacturing has become the chief occupation. Steam power is now largely used, however, coal for fuel being brought chiefly by sea from the ports of Chesapeake and Delaware bays.

The section produces practically no coal or raw materials, other than stone and wood; hence the articles manufactured are those which have a high value in comparison with that of the fuel and material used.

The chief manufactures are cotton and woolen cloth and boots and shoes, of which this section produces more than all the rest of the country. Other characteristic manufactures are brass goods, paper, wood pulp, light hardware, fine machinery, fire-arms, clothing, silk, jewelry, and rubber goods.

Over half the granite and marble, and much of the slate, used in the country are quarried in New England.

Southern New England is the most densely peopled part of the United States. More than half the people there live in cities.

To supply the needs of the dense manufacturing population, the southern half of the section is covered with a network of railways, which connects it with the south and west, and also with the railway systems of Canada. The glacier-carved fiords and bays of the New England coast contain many fine harbors, from which vessels carry on an active coasting or fishing trade; and Boston maintains a large foreign commerce.

The care of "summer boarders" is an important occupation several months each year throughout New England, especially along the seashore and in the beautiful mountain and lake regions.

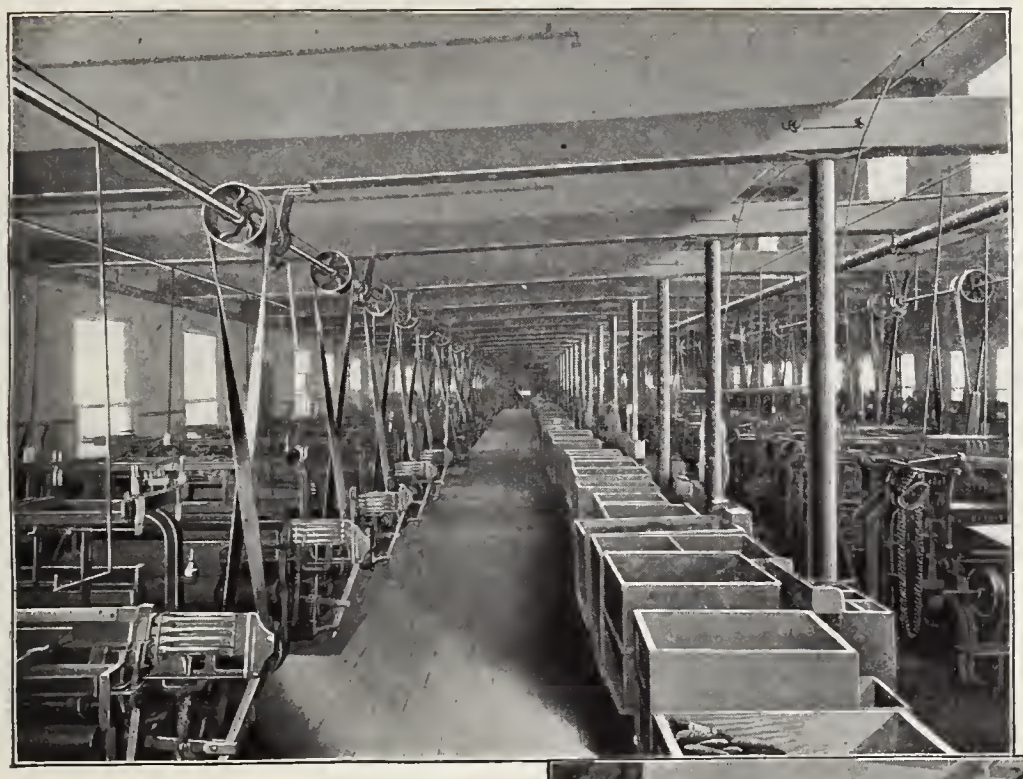
While the greater part of the population is native-born, there are many foreigners, largely Canadians, Irish, and English. As a whole the people are energetic and well educated, and they maintain fine public school systems. There are also located in this section several of the oldest and most noted universities and colleges in the country.

Maine. Bound Maine. How does this state compare with the rest of New England in size? How does it compare in size with the state in which you live (p. 50)? Describe the surface of Maine; its rivers; its coast. Name and locate the capital and the five chief cities of the state.

Maine belongs to the forest region of New England, about half of its surface being covered with pine, spruce, hemlock, and birch. These forests furnish lumber and the wood pulp used to make paper. Hay, potatoes, oats, and apples are the more important farm products. Quantities of granite and slate are quarried, and much ice is cut for shipment. Herring and cod are caught along the rocky coast, and on the shore of the sheltered bays are many herring-curing establishments (§ 131, p. 32).

Portland, the chief seaport and most important city, is connected by rail with the principal railway systems of Canada. It has a fine harbor with an important foreign commerce when the St. Lawrence is frozen. Its extensive manufactures include clothing, machinery, lumber, and boots and shoes. At *Lewiston* cotton and woolen goods are made. *Bangor*, at the head of navigation on the Penobscot, has shoe factories and is one of the great lumber depots of the country. *Biddeford* has large cotton mills. *Auburn* has large boot and shoe factories. At *Augusta*, the capital, cotton goods and shoes are manufactured.

MARBLE QUARRY, NEAR RUTLAND, VT.



Woolen Mill, Dover, N.H.

New Hampshire. By what is New Hampshire bordered? How does it compare with Maine in size? What two rivers drain the larger part of it? What mountain group is in the north? Name the chief peak. Name and locate the largest lake; the capital; three other cities.

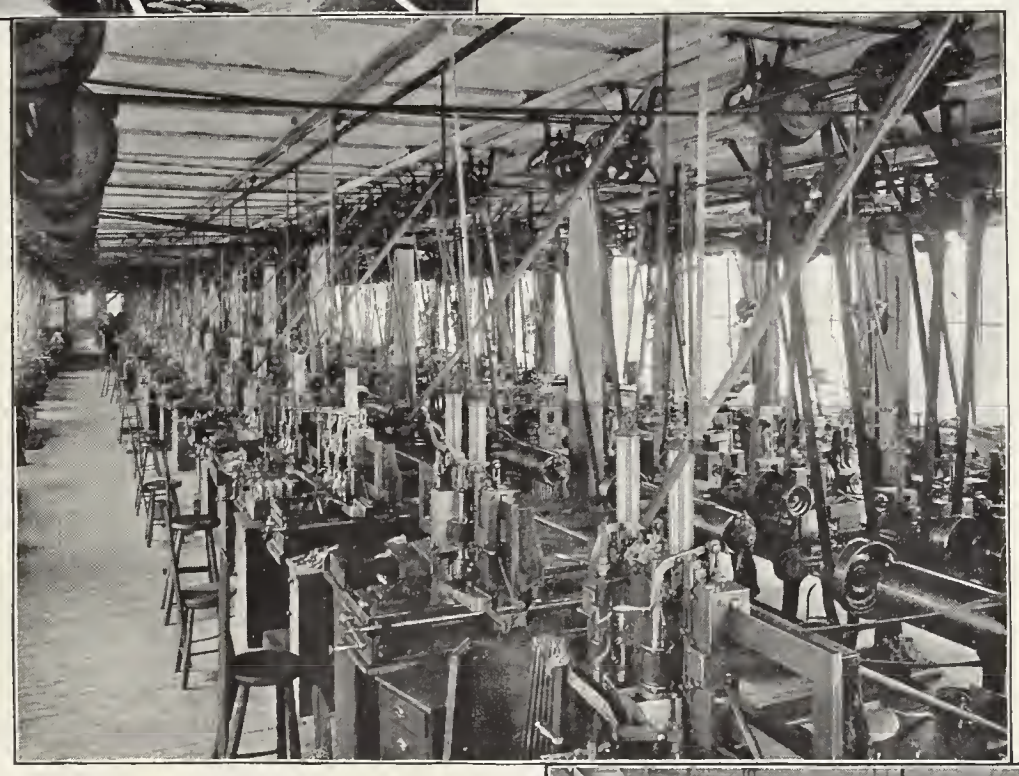
New Hampshire, often called the "Switzerland of America" because of its beautiful mountain scenery, has large forests and great granite quarries, both of which give rise to important industries. The chief industry, however, is manufacturing, which is largely carried on in the southern part of the state, where the water power of the Merrimac River is available. In the manufacture of boots and shoes this state takes high rank.

Manchester and *Nashua*, located at falls on the Merrimac, have large cotton mills. *Concord*, the capital, has cloth mills, wagon and carriage factories, and granite quarries. The fine water power at *Dover* is utilized by large cotton and woolen mills.

Vermont. What lake and river form nearly half the boundary of Vermont? What states and country border it? Has Vermont a seaport? Draw the main divide of the state. Name and locate the mountains of Vermont; the capital; the two chief cities.

The rounded summits of the Green Mountain range are covered with forests of evergreen pines and spruces. Vermont means "Green Mountain." There are many dairy farms and sheep ranges, and fine breeds of live stock are kept. Much hay is produced. Lumber is obtained from the forests, and more maple sugar is produced than in any other state. From Vermont come much granite and slate, and over half the marble quarried in the United States. Lumber, woolens, musical instruments, and scales are manufactured. There is considerable trade with Canada through Lake Champlain.

Burlington, the chief city, has a fine harbor and is an important lumber market. Near *Rutland* are the largest marble quarries in the world, and the notably white and durable marble gives rise to an extensive manufacture of monuments and tombstones.



Gun Factory, Springfield, Mass.

Massachusetts. What states and waters border Massachusetts? Describe its coast; its surface. Name and locate its mountains; rivers; capes; bays; islands. Name and locate its capital; five other cities not far away; three cities on the Merrimac; two in southern Massachusetts; two on the Connecticut River; one in the central part of the state.

Massachusetts is one of the wealthiest states of the Union, although one of the smallest. It is very densely peopled. Manufacture and commerce are the leading industries. In this state are manufactured nearly half of the boots and shoes, and a large part of the cotton and woolen cloth and paper made in the United States. The commerce, both foreign and domestic, is very large. Many vessels enter the harbors, and the eastern part of the state is thickly intersected by railroads from the north, the west, and the south.

Massachusetts is foremost among the states of the Union in the quarrying of granite and in the value of cod fisheries.

Shoe Factory, Lynn, Mass.

Boston is the great commercial center for nearly the whole of New England, receiving and distributing throughout the section raw materials, — wool, cotton,

hides, leather, rubber, and coal, — and receiving in return manufactured goods for distribution by sea or by railroad. It owes its growth and importance chiefly to the great size, depth, and excellence of its island-studded harbor at the head of Massachusetts Bay.

On the east water front are the great docks where foreign commerce is carried on; the mouth of Charles River, to the north, is used more for the coast trade. Nearly the whole steam railroad system of the section and many electric lines radiate from the city.

PUBLIC LIBRARY, BOSTON, MASS.

Boston is one of the great manufacturing centers of the United States; the making of clothing, fine machinery, and books are leading industries.

Because of the fine schools, colleges, and libraries there, and the great number of authors, musicians, and artists who have lived in or near the city, the citizens often call Boston the "Athens of America."

Boston is one of the oldest of the great American cities. The original Puritan settlement was on a small peninsula between Charles River and the harbor. On this peninsula there were three hills, and between them and the mainland were wide salt marshes which were flooded by the tides, so that at high water the peninsula was connected with the mainland only by a long, narrow "neck" of land. The marshes have been filled, and the newly made land and much of the mainland over which the city has spread have become fine residential quarters, while most of the old peninsula is given up to business.

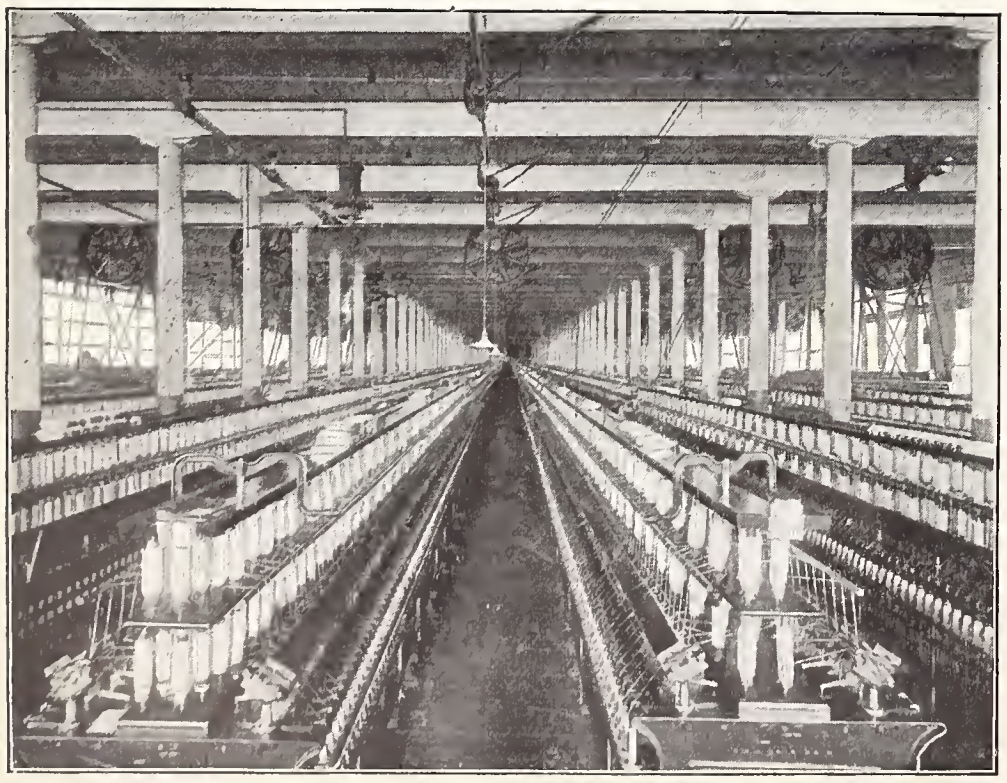
Worcester is a great railroad center, and is noted for the manufacture of machinery, shoes, and wire. At *Cambridge* is located Harvard University, the oldest and one of the largest in the country. *Fall River*, *Lowell*, and *New Bedford* are the great centers of cotton manufacture; *Lawrence*, of both cotton and wool; at *Lynn*, *Brockton*, and *Haverhill* millions of boots and shoes are made; and at *Springfield* is a United States arsenal and factory for firearms. *Holyoke* has large paper mills. *Salem* has large tanneries.

Connecticut. By what states and waters is Connecticut bordered? Describe its surface; drainage; coast. Name and locate the capital; the other important cities of the state.

Tobacco raising in the Connecticut valley, and dairying and vegetable and seed farming in the western and southern parts of the state, are important industries. There are extensive oyster beds in Long Island Sound.

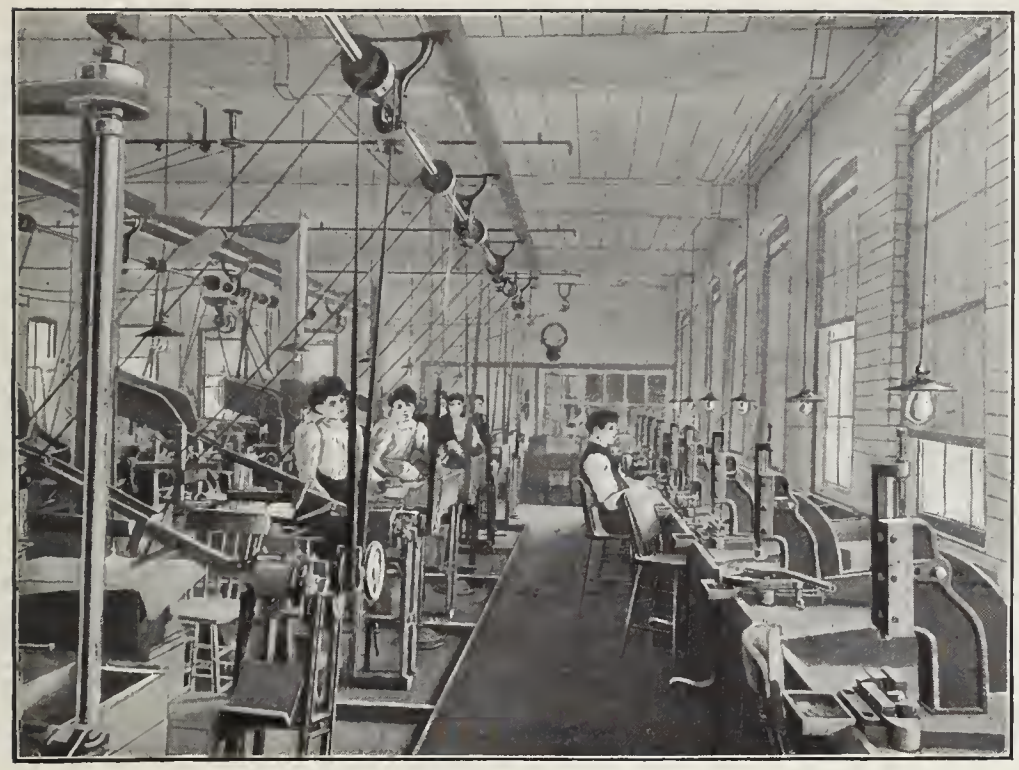
The state has valuable sandstone quarries and is especially noted for the variety of its manufactures. These include cotton and woolen goods, almost every kind of fine cutlery and hardware, tools and machinery, needles, pins, hooks and eyes, clocks, firearms, motor carriages, sewing machines, and all kinds of brass and plated ware.

New Haven, the seat of Yale University, one of the most famous in the country, is the largest city and chief port. *Hartford* is the headquarters of many insurance companies, and is noted for the manufacture of machinery, vehicles, and firearms. *Bridgeport* manufactures ammunition and machinery; *Waterbury*, brass ware and clocks; *New Britain*, hardware; and *Meriden*, plated ware.



SPINNING IN A COTTON MILL, FALL RIVER, MASS.

LOCK WORKS, NEW BRITAIN, CONN.



PIN FACTORY, CONNECTICUT.

JEWELRY SHOP, PROVIDENCE, R.I.

Rhode Island. Bound Rhode Island. Describe its drainage. Name a bay, a cape, and a river of this state; its capital; three other cities.

Rhode Island is the smallest and most densely peopled state in the country, and in proportion to its size has the most manufacturing,

Providence, the second city in New England, exceeds all other cities in this country in the manufacture of jewelry. It has many woolen mills, foundries and machine shops, and silverware factories. *Pawtucket* and *Woonsocket* are centers of both cotton and woolen manufacture. *Newport* is a famous summer resort.

Supplemental Work. Read chapters 9, 10, and 11, "Carpenter's Geographical Reader, North America." Describe, as fully as Boston is described, one other city or place in New England.

THE NORTHERN SECTION

Begin this lesson by studying the Map Questions on page 60.

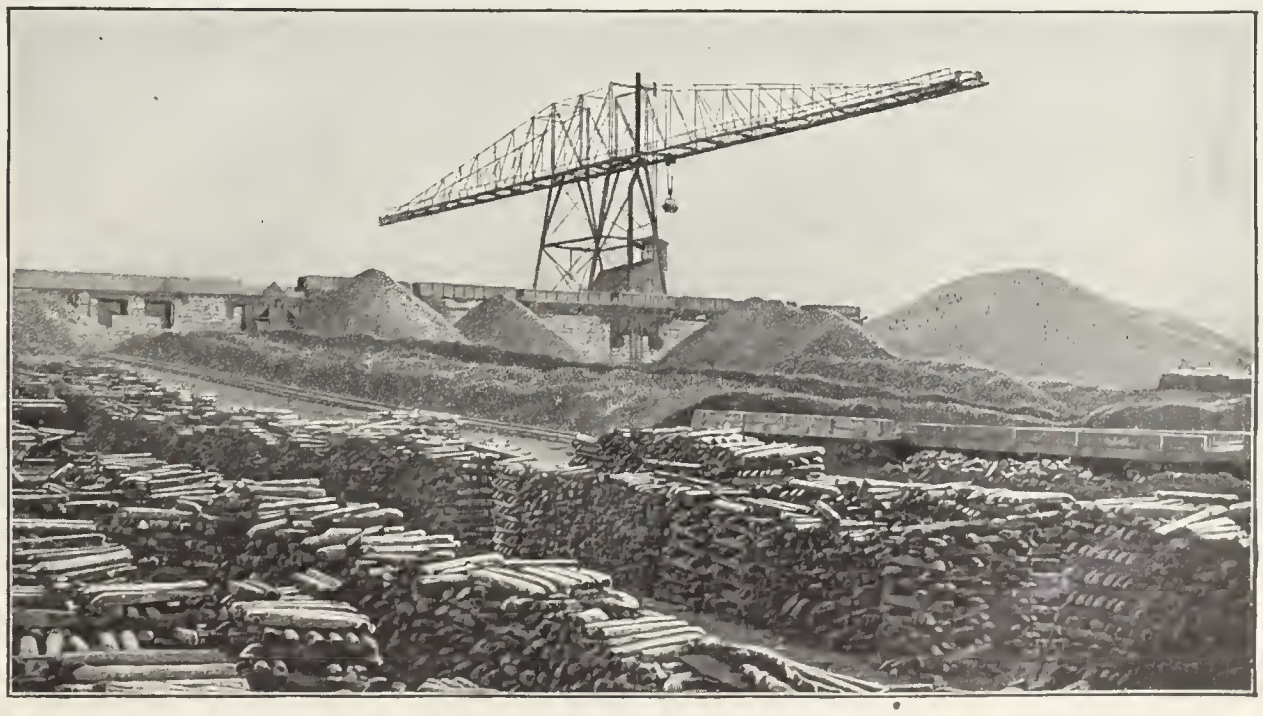
Throughout the Northern Section the surface is comparatively smooth and flat, except in the Appalachian region in the east, the Ozark Mountains in the south, and the Black Hills in the extreme west. The soil nearly everywhere is deep and fertile, and composed largely of the rock waste deposited by the old Laurentian glacier, which in New England swept much of the soil off into the sea.

The climate is favorable for agriculture, the summers being warm and, except in the extreme west, the rainfall is ample. The people have seized upon these natural advantages and have made agriculture the most important industry of the section; and through the invention and use of improved agricultural implements they have made this one of the greatest food-producing regions of the world.

In the states of this section, especially in the region west of the Appalachian Mountains, the chief food crops are raised in enormous quantities, so that about five sixths of our country's yield of wheat, corn, oats, hay, and potatoes comes from the section (maps, p. 51). Other food crops of lesser importance are grown, as well as the bulk of the tobacco crop of the United States.

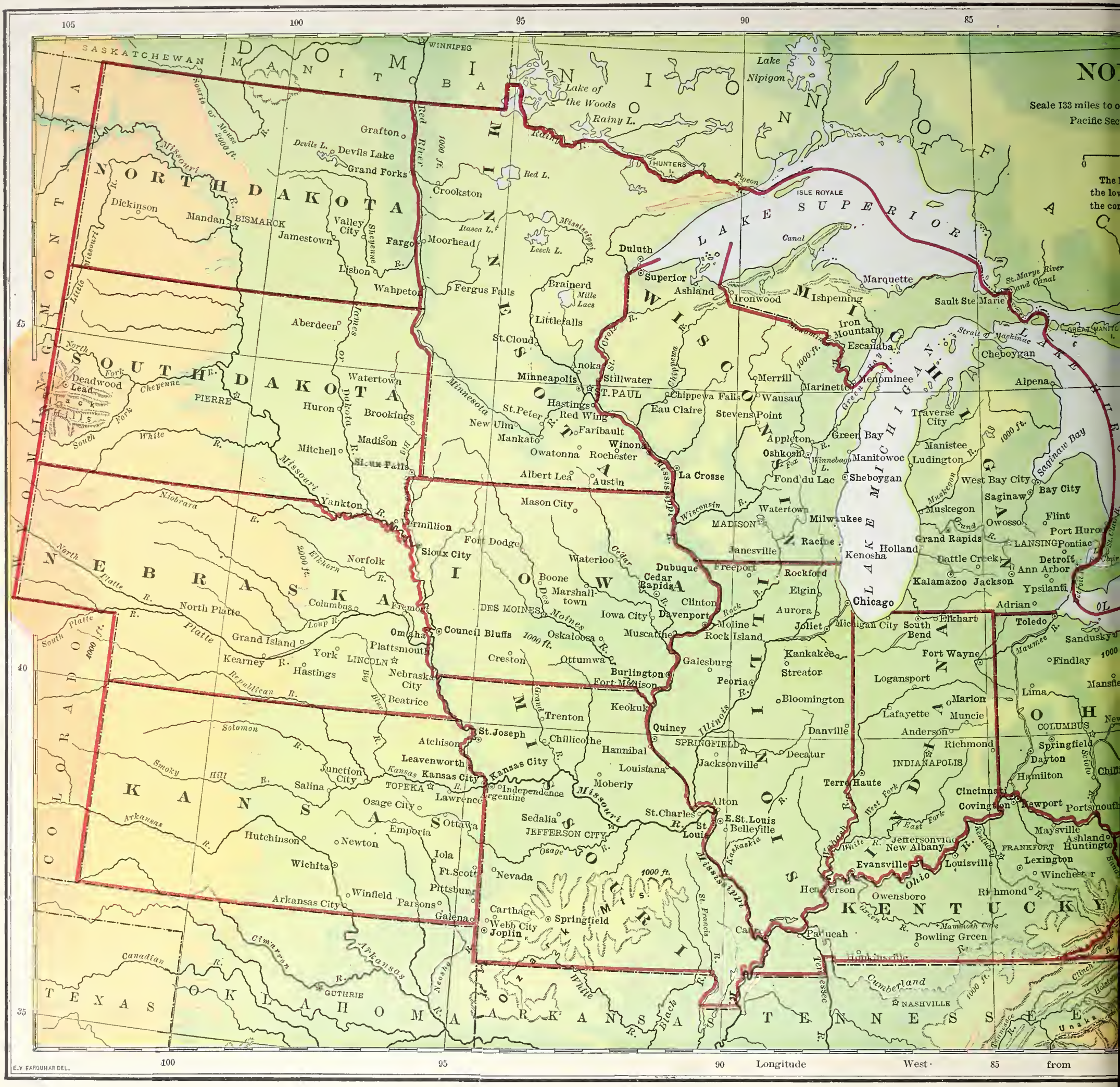
Because domestic animals are largely dependent upon the attention of man and the crops which he raises, most of the hogs, cattle, and butter and eggs produced in the country come from this section (p. 52). On the Atlantic coast of the section are the greatest oyster fisheries of the United States.

In the forest regions of this section (map, p. 52), lumbering is an important industry; the pine belt of the Great Lakes being one of the great timber-producing regions of the Union.



STORAGE YARD OF A BLAST FURNACE, PENNSYLVANIA.

The largest coal and iron mines of the country are in this section, and the section also supplies a large part of the product of petroleum and copper (pp. 52, 53). There are valuable lead and zinc mines west of the Ozark Mountains.

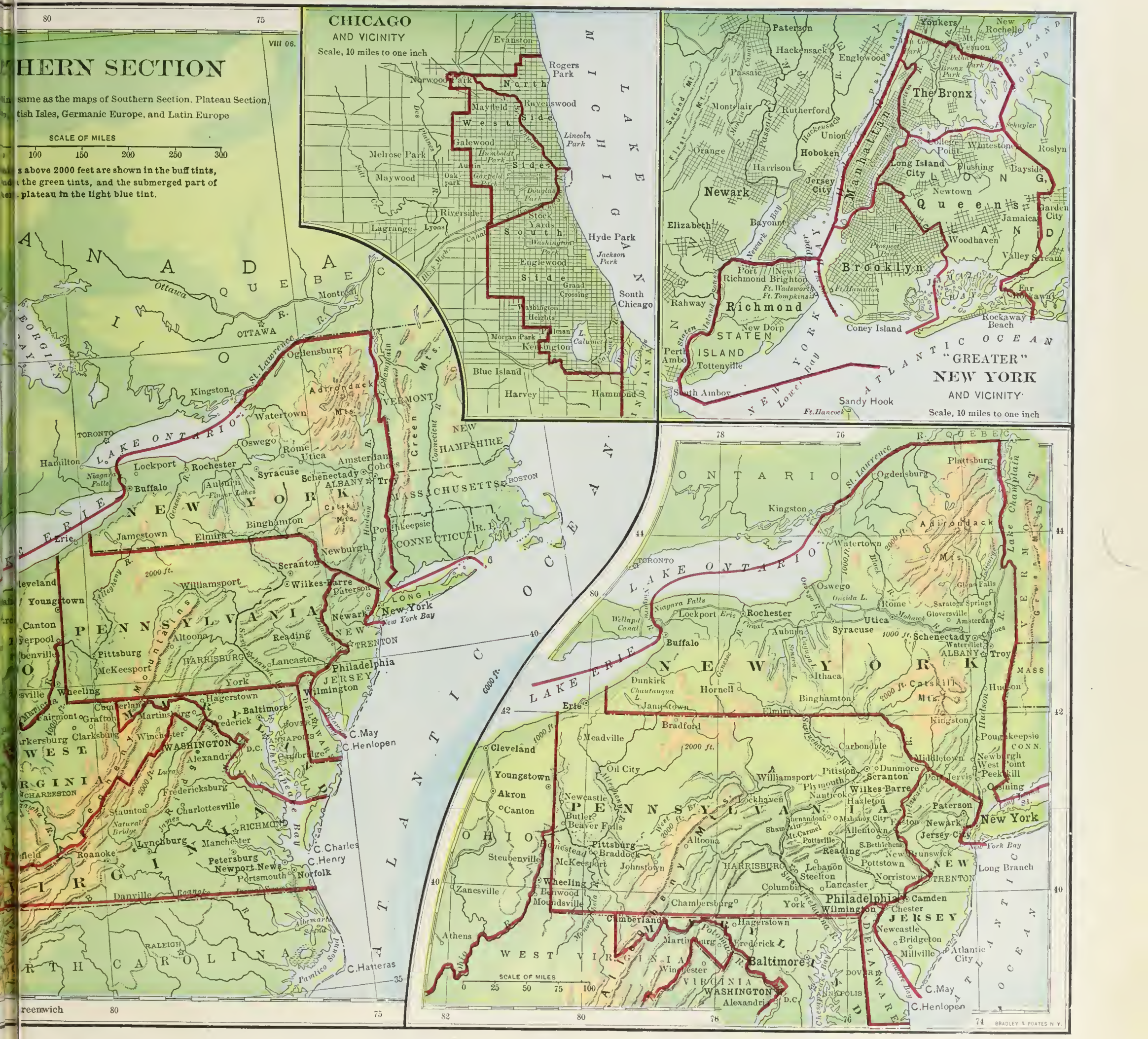


Map Questions. Which states of this section are crossed by the Appalachian Mountains or the Atlantic plain? Which states lie between the Appalachian Mountains and the Mississippi River? Which states lie mostly in the Lake plains? Which lie mostly in the Prairie plains? Which lie partly in the Great Plains?

It will be seen from the city map on p. 53 that the eastern and central parts of this section are included in the great manufacturing region of the United States. The manufactures are chiefly those which utilize the raw materials produced in the section — food products, lumber, and iron ore.

West of the Appalachian Mountains, flour milling and the packing and curing of meat are characteristic industries. Along the Great Lakes and on the Allegheny plateaus are sawmills, while the iron and steel industries are centered at points where coal and iron ore can be most cheaply brought together. The manufacture of tobacco is important in the southern part of the section. East of the mountains the manufactures are more varied and consume much raw material not produced in the section. The weaving of cotton, wool, and silk, and the refining of sugar, are extensive industries of this kind.

New York Bay, Delaware Bay, and Chesapeake Bay, which indent the east coast of this section, are all deep enough for the largest vessels, and contain the best har-



bors on our Atlantic coast south of New England. The chief rivers which flow into these bays — the Hudson, the Delaware, and the Susquehanna and Potomac — all rise west of the Appalachian ridges and cross them through water gaps (p. 44), but south of the Potomac River the Blue Ridge is an almost continuous wall between the coast and the Mississippi valley. The railroad map (p. 53) shows the effect of this peculiar Appalachian drainage on the railroad system of the country. The seaports on the three bays of this section are therefore among the largest cities of the country, and through them by far the greater part of our foreign commerce passes.

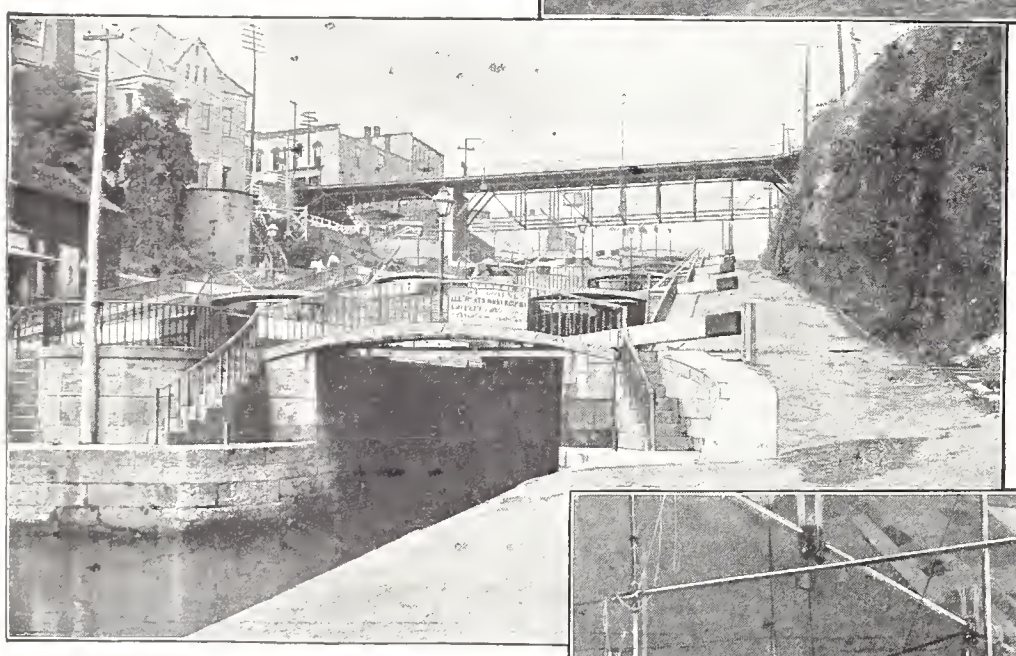
West of the Appalachian Mountains the smooth surface of this section is covered with a network of railroads, by which raw materials are collected and taken to manufacturing centers, and the manufactured products are afterward distributed.

The Great Lakes are connected by navigable straits or canals, and form a commercial route of great importance. Niagara River, in its course from Lake Erie to Lake Ontario, plunges over a cliff about 160 feet

high, forming Niagara Falls — one of the grandest cataracts (§ 55) in the world. As the falls interrupt the navigation of the river, the Welland Canal has been constructed between the lakes, through Canada.

Canals have also been constructed in Canada around the rapids of the St. Lawrence River to tide water at Montreal. The Erie Canal, from Lake Erie by way of the low Mohawk valley to the Hudson, forms a most

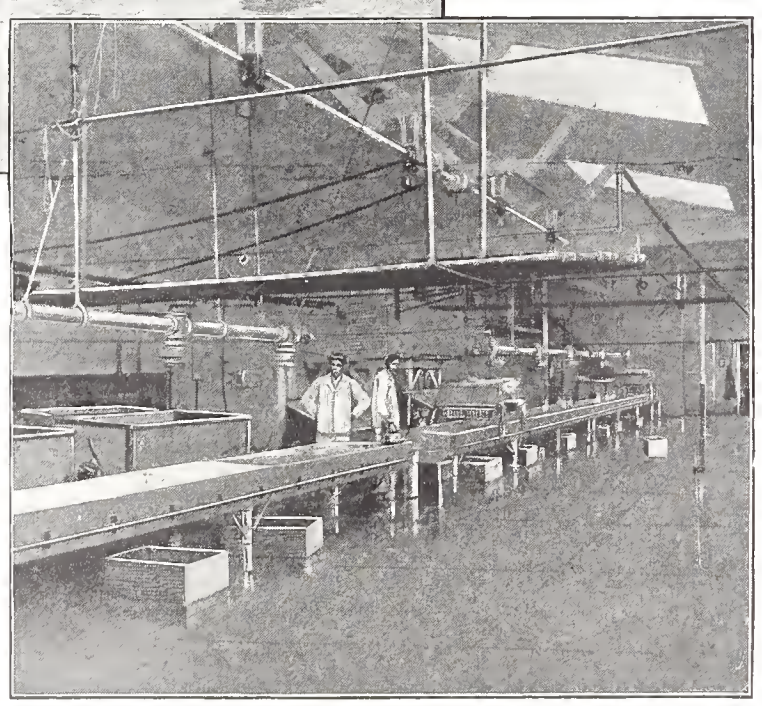
Niagara Falls.



Locks on the Erie Canal.

important water route through our own country from the Great Lakes to tide water.

The Mississippi, Ohio, and Missouri rivers and many of their tributaries are much used for transporting coal, lumber, and other bulky freight. Several canals have been constructed through the low divide to connect the Great Lakes with the Mississippi system.



Creamery, Southern New York.

The Northern section contains about two thirds of all the people in the United States, and nearly three fourths of all the foreign immigrants in the country.

The Northern Appalachian States. The seven states of this section which are crossed by the Appalachian region or by the Atlantic plain are sometimes called the "Middle States." A very large part of our coal and petroleum, and much iron ore, come from this region. Manufacturing and the production of food crops are more important in the northern part, while market gardening and the production of oysters and tobacco are of great importance in the southern.

New York. What states and country border New York? What three lakes form part of the boundary? What river system drains the northern part? Trace its divide across the state. To what great river system does the southwestern part drain? In what slope is the southeastern half of the state? Name and locate the mountains of New York; the islands; the lakes. By what river are the small lakes in the west-central part drained into Lake Ontario? What is the chief tributary of the Hudson? Name and locate the capital; the chief city; the chief lake port; a city on the Genesee River; four other large cities.

New York, though of only medium size, is the first state in the Union in population, commerce, and manufacturing, and is one of the first in agriculture. Its preëminence depends largely upon the existence in the state of the lowest route to the West through the Appalachian Mountains. This route, following the Hudson and Mohawk valleys, is occupied by railroads and the Erie Canal. As passengers and freight do not have to be lifted over the mountains, transportation is easy and cheap, and the route has become a great commercial thoroughfare, attracting population and developing industries in its neighborhood, and making New York city, with its fine harbor, the greatest seaport in America. Canals connect the Hudson with the St. Lawrence through Lake Champlain, and also with the Delaware and the coal fields of Pennsylvania.

Much water power is utilized in manufacturing, and fuel is obtained from the near-by Pennsylvania coal fields. Clothing, machinery, printed matter, textiles, refined sugar, beer, packed meat, and tobacco are the chief manufactures.

The state is noted for its dairy products, and for its large crops of potatoes, buckwheat, and hops. Much salt is also obtained, especially from wells in the Genesee valley.

New York is the largest and most important city in the United States, and is second only to London among the great cities of the world. It contains about four millions of people, and covers a land area of about 360 square miles.

Founded by the Dutch on the south end of Manhattan Island, at the mouth of the Hudson, the city has gradually spread over the island, and has also taken within its limits a part of the mainland to the north, Staten Island, and the west end of Long Island, including the great city of Brooklyn.

Traffic from the west and south reaches the city by ferry, and tunnels are now building under the Hudson River. The harbor is large enough to accommodate many hundreds of ships. More than half of the foreign trade of the country is carried on through this port.

So much money is controlled by the banks of New York that when great business enterprises are started anywhere in the country the capital required is generally obtained in New York.

Office Buildings, New York City.

New York is the chief manufacturing city of the country. Nearly everything needed by man is made here, but the making of clothing is by far the greatest industry.

Large quantities of raw sugar from the West Indies are refined, and petroleum, flowing from western Pennsylvania through pipe lines, is made into kerosene in the vicinity. More books, magazines, and newspapers are published in New York than in any other city of the United States. Columbia University, one of the largest universities in the country, is located in New York.

The southern half of Manhattan Island embraces the wholesale business region, and it is much crowded. Thousands of the business men live ten or more miles from their places of business — in the northern part of the city, on Long Island, on Staten Island, in New Jersey, and on the mainland to the north.

Buffalo is the western terminus of the Erie Canal, and a great railroad center. The reshipment of wheat, flour, and meat from the West is a very important industry. Much coal and salt are shipped westward. Packed meats, iron and steel machinery, and linseed oil are the chief manufactures. Electricity generated by the water power of Niagara Falls is used in Buffalo.

Rochester, at the falls of the Genesee, manufactures clothing, boots and shoes, and machinery, and has many nurseries in its vicinity. *Syracuse* manufactures clothing, machinery, and iron and steel, and has famous salt springs. *Albany*, the capital, is an important railroad center, and manufactures cars, beer, and machinery. *Troy* is the terminus of the Erie Canal and of the Champlain Canal. It is also at the head of tidewater in the Hudson. It has large manufactories of shirts, collars, and cuffs, and foundries and machine shops. *Utica* manufactures clothing and knit goods, and has large nurseries. It is the chief cheese market of central New York. *Yonkers* and *Schenectady* are also large manufacturing cities.

At *West Point* is the United States Military Academy. Cornell University, at *Ithaca*, is among our largest institutions of learning.

Pennsylvania. What states border Pennsylvania? Describe its surface. Trace across the state the principal divide. What two large rivers are on the eastern slope; on the western? Into what does each flow? Locate the capital; the chief city; three other important cities of the eastern slope; two of the western.

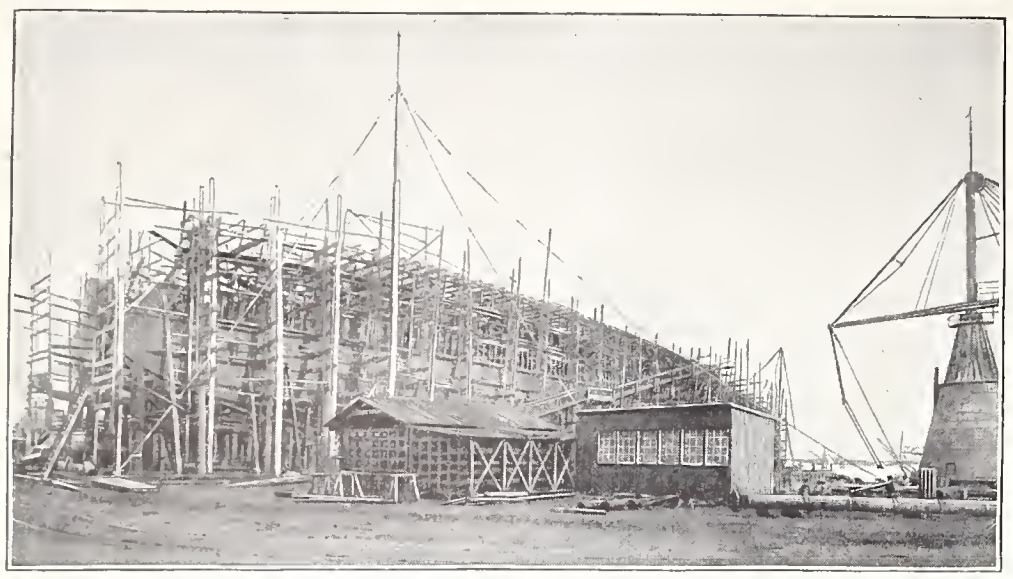
Pennsylvania is the great coal-producing state, and stands second in population and the value of manufactures. Bituminous coal is found in the Allegheny plateaus, and anthracite coal in the rock folds of the ridges in the northeastern part of the state. Much petroleum is obtained in the Allegheny and Monongahela valleys. Other mineral products are cement and slate.

The characteristic manufactures of the western part of the state are iron and steel (from Lake Superior ore), and coke made from coal. In these industries Pennsylvania exceeds all the other states combined. In the eastern part of the state, the weaving of wool, cotton, and silk is an important industry; and machinery, cars, flour, and refined sugar and petroleum products are manufactured extensively.

Coal Mine, Pennsylvania.

From the forest-covered mountains lumber is floated down the rivers to the sawmills and planing mills, and with the oak and hemlock bark much leather is tanned in the northwestern part of the state.

Entrance to Harbor, Buffalo, N.Y.



Shipbuilding, Philadelphia, Pa.

The soil of the valleys and of the eastern lowland is fertile, and Pennsylvania has a high rank as an agricultural state. Dairying is an important industry.

Several great railroads from the seaboard to the Mississippi valley cross the mountains in this state amidst beautiful scenery. Railroads also connect the bituminous coal regions with Lake Erie, and the anthracite coal regions have rail and canal connection with New York, Delaware, and Chesapeake bays.

Philadelphia is the third city in the Union in population. It was founded by English Quakers, and for a long time was called "the Quaker City." It was laid out between the Delaware and Schuylkill rivers near their junction, but it has now spread far west of the Schuylkill and along the Delaware for many miles.

The nearness of the anthracite coal region makes fuel plentiful and cheap, and Philadelphia has become one of the greatest manufacturing cities of the country. Among its manufactures are woolen goods, carpets, and clothing. Sugar refining, tanning, and the making of heavy machinery, locomotives, and steamships, are also important industries.

Ocean steamers ascend to the wharves of Philadelphia, and much coal is exported.

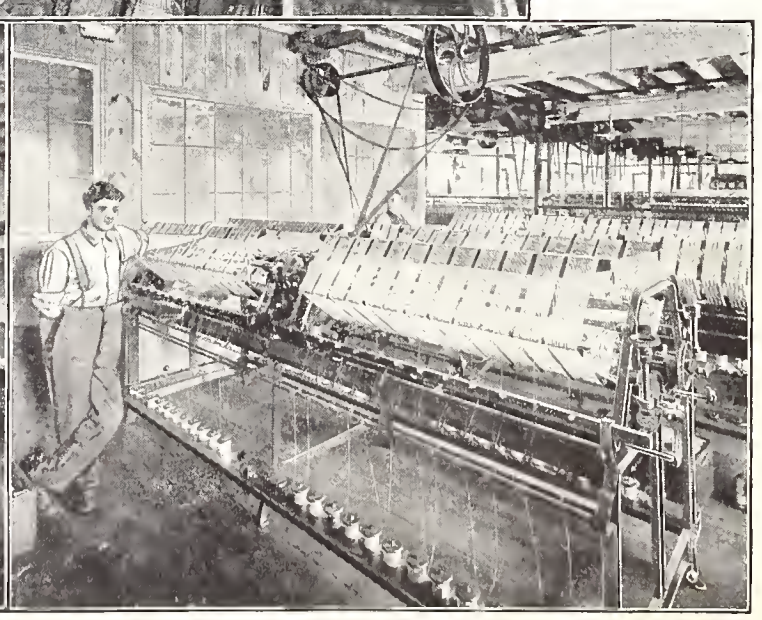
Congress was in session in Philadelphia when it declared the independence of this country in 1776. After the Revolutionary War Philadelphia was the capital of the country for several years. Independence Hall, in which the Declaration of Independence was made and the Constitution framed, is much visited. In Philadelphia is located the great University of Pennsylvania.

Pittsburg, which now includes the city of Allegheny, forms the great center of population in western Pennsylvania. It is in the heart of the bituminous coal, petroleum, and natural gas region. The city possesses the great commercial advantage of the water routes afforded by the Ohio and the two rivers which here unite to form it, and millions of bushels of coal are shipped from Pittsburg down the Ohio. A large part of the coke of the country, and much of the structural and railway iron and steel, are made here; Pittsburg is also the greatest center in the world for the manufacture of plate glass. Pickles, packed meat, and leather are also manufactured.

Scranton is a mining center of the anthracite coal region. It is also a railroad center, with large iron and steel works, silk mills, and machine shops. *Reading* is in a rich agricultural region, and receives by canal cheap fuel from the anthracite regions to supply its iron and steel works and foundries. *Erie* has a fine harbor and a large trade in iron ore, lumber, and coal. It has important steel works, foundries, and flour mills. *Wilkes-Barre*, in the anthracite coal region, manufactures iron and steel machinery, silk, and lumber. *Harrisburg*, the capital, is located in a fertile region, and manufactures iron, steel, and railroad cars.

Pottery, Trenton, N.J.

Carpet Weaving, Philadelphia, Pa.



Silk Factory, Paterson, N.J.

New Jersey. Bound New Jersey. Describe the coast. Locate two large bays; the mountains; the capital; three large cities in the northern part; one in the western part.

New Jersey is one of the small states of the Union. The northeastern part, however, is a great commercial and manufacturing region. The state ranks first in the manufacture of silk. The making of machinery, malt liquors, and leather, and the refining of petroleum, are important industries. Vegetables and fruit are raised in large quantities. The coast

region is sandy, and the beaches are great summer resorts. The state is crossed by two canals and many railroads.

Newark manufactures leather, jewelry, malt liquors, and machinery. *Jersey City* is commercially a part of New York city. It has many manufactories. Here and in the adjoining cities of *Hoboken* and *Bayonne* are the terminal freight and coal yards of many railroads, and extensive wharves of many ocean and coastwise steamer lines. In *Paterson* more silk is manufactured than in any other American city. *Trenton* manufactures steel goods and pottery. *Camden*, really a suburb of Philadelphia, manufactures leather, steamships, woolen goods, and machinery. *Elizabeth* manufactures machinery.

Delaware. By what waters and states is Delaware bounded? Compare it in size with New Jersey. Locate the capital; the chief city.

Delaware lies wholly in the coast plain. The northern part is a manufacturing region; the southern part a

POWDER WORKS, WILMINGTON, DEL.

grain, vegetable, and fruit region, the Delaware peaches being particularly excellent and abundant. The canning of fruits and vegetables is an important industry.

Wilmington contains a large part of the population of Delaware, and within its limits are most of the important manufactories of the state. Here are tanneries, car works, shipyards, machine shops, foundries, and powder works.

Maryland. What river forms most of the southern boundary of Maryland? By what states is Maryland bounded? What other states own parts of the peninsula including eastern Maryland? Which part of the state is in the mountain region? Locate the capital; the chief city; one other city.

Chesapeake Bay has many good harbors, and the chief oyster beds of the country. Grain, fruit, vegetables, and tobacco are important products. In the mountains of the western part are valuable coal mines.

WHARVES, BALTIMORE, MD.

CONGRESSIONAL LIBRARY, WASHINGTON.

Baltimore is one of the cities on the Fall line (p. 43). Its fine harbor, to which the valley of the Potomac River is an accessible route, is nearer the grain region of the interior than of any other large Atlantic seaport. For these reasons Baltimore is a great food-shipping port. The making of clothing, the canning of fruit, vegetables, and oysters from the surrounding region, and the manufacture of tobacco, are the principal industries. Baltimore is the seat of the famous Johns Hopkins University.

Cumberland has a canal to tide water in the Potomac, and is the shipping point for the Maryland coal regions. It has important iron and steel works and foundries.

At *Annapolis* is the United States Naval Academy.

The District of Columbia. The District of Columbia was given to the United States by Maryland as a site for the national capital.

Washington, the most beautiful city in the United States, is situated where the Potomac River crosses the Fall line. Unlike most cities, it was planned as a large capital city before it was built. It has broad, straight streets and avenues, and many parks. These are shaded with fine trees and decorated with statues and monuments.

Though Washington is built where water power can be obtained, and where navigation from the sea is possible, the city has little commerce or manufacturing other than government printing. It has grown up simply as the national capital.

The President of the United States lives in Washington, as well as the members of the Cabinet and the foreign ministers who come to our country from all the nations of the earth to represent their governments and to look after the interests of their people. The senators and representatives meet in the Capitol (p. 48), and Congress is in session for several months of each year.

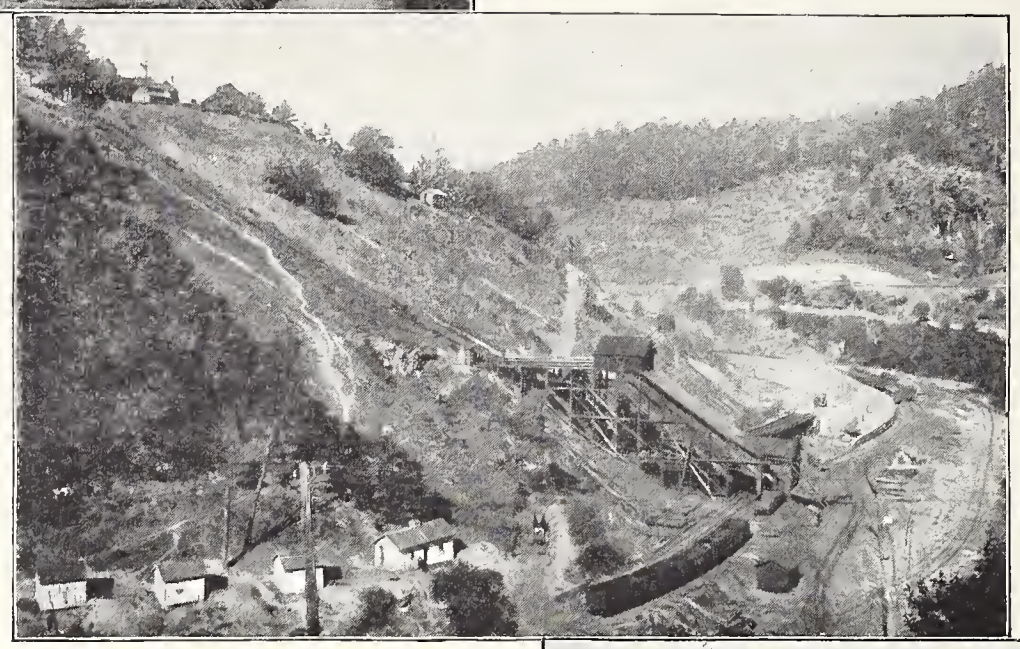
Tobacco Market, Danville, Va.

Virginia. What states border Virginia? Trace through the state the divide of the Mississippi basin. Name three rivers of the Atlantic slope; two of the Mississippi slope. Locate two capes; the mountain ranges; the capital; the chief seaports; two other important cities in the basin of the James; two in the Roanoke basin.

Virginia ranks among the foremost states in the Union in the production of tobacco, and its peanut crop is the largest in the country. The Great Valley west of Blue Ridge is a fertile wheat region. In it are the caverns (§ 42, p. 13) of Luray, and the Natural Bridge. About half the people of the state are engaged in agriculture.

There are valuable coal and iron mines. By means of the valleys and water gaps of the Kanawha, Roanoke, James, and Potomac rivers, several railway lines cross the mountains and convey coal and other products to the harbors of Chesapeake Bay.

Richmond, the industrial center and capital, is famous as the capital of the Confederacy during the Civil War. It has a large trade and extensive manufactories of tobacco, machinery, and iron goods. *Norfolk* (with *Portsmouth* opposite) has a fine harbor and is an important shipping point, especially for coal and cotton. A United States Navy Yard is located near here. *Petersburg*, on the Fall line, has cotton and silk mills and tobacco factories. *Roanoke* has large iron and machine works. *Newport News* is an important railroad terminus and seaport. Steel vessels are built in its shipyards. *Lynchburg* and *Danville* are tobacco markets.



Coal Mine, West Virginia.

West Virginia. Bound West Virginia. Trace the main divide across the state. What river basin embraces most of the state? Locate the capital; three cities on the Ohio.

West Virginia is one of the foremost states in the production of petroleum, coal, and natural gas. Much salt also is produced. There are extensive forests and fine grazing lands on the plateaus; farming is pursued chiefly in the fertile lower lands farther west.

Wheeling, in a coal and gas region, manufactures steel and glass. *Huntington* ships coal and lumber. *Parkersburg* is in the oil region; and *Charleston*, in the lumber region.

Supplemental Work. Read chapters 5–8, 12, 26–29, "Carpenter's Geographical Reader, North America." Describe, as fully as New York is described, one other city in this section.

The Ohio Valley and Upper Lake States. The six states of this section that lie between the Appalachian Mountains and the Mississippi River are sometimes called the "East Central States." Name these states. Through them trace the divide between the St. Lawrence and Mississippi basins. Which states are in both basins? Which are in only one basin? A larger or smaller part of each of these states lies in the Prairie plains, and all are heavy producers of grain and meat. Extensive forests and rich deposits of coal add to the resources of this group.

Harbor of Cleveland, Ohio.

Ohio. Give the natural boundaries of Ohio. What states border it? Name one tributary of Lake Erie; two of the Ohio. Trace through the state the main divide. Locate the capital; two lake ports; five other important cities.

Ohio holds a high rank both in manufacturing and in agriculture, and it is one of the chief wool-growing states in the Union. It stands high also in the production of petroleum and natural gas. The abundance of iron ore and coal in the eastern part of the state, and the ease with which ore can be obtained from the Lake Superior regions by way of the Great Lakes, give to Ohio great advantages for manufacturing. Iron and steel, machin-

ery, flour, lumber, liquors, and tobacco are important manufactures. Fruit farming, dairying, and tobacco raising are carried on extensively.

Cleveland, the largest city of Ohio, is situated on Lake Erie at the mouth of Cuyahoga River. From this point a canal extends south to the Ohio River by way of the Scioto valley. Several railroads leading to the Mohawk valley from the agricultural regions to the west and southwest, converge at Cleveland and help to make it a great commercial center. The nearness of coal, petroleum, and natural gas fields to the southeast, and the low rate at which grain, lumber, and iron ore can be received by way of the Great Lakes, have made Cleveland a great manufacturing center. Iron and steel manufacturing, meat packing, petroleum refining, and shipbuilding are among the chief industries.

River Landing, Cincinnati, Ohio.

Cincinnati is situated on the broad flood plain of the Ohio, between the Great and Little Miami rivers, and opposite the mouth of the Licking — the valleys of these streams affording gradual descent to the Ohio River at this point. Through one of these valleys a canal extends to Lake Erie. Before railroads existed, the Ohio was the chief trade route of this whole region, and Cincinnati soon became the greatest commercial center of the Ohio basin. Cheap coal is obtained by river from Pittsburg, and Cincinnati has become a great manufacturing center. The chief manufactures are clothing, distilled and malt liquors, and machinery. The part of the city in the flood plain is devoted largely to business, while the residential part on the surrounding hill tops is reached by several inclined-plane railroads up the steep face of the bluffs.

Toledo, a great railroad center, with a fine harbor and a canal to Cincinnati, is an important commercial and manufacturing city. *Columbus*, the capital, on the canal from Cleveland to the Ohio, is an important trade center, and manufactures iron and steel, and machinery. *Dayton*, on the canal from Toledo to Cincinnati, manufactures much machinery. *Youngstown* has large iron and steel works. *Akron* is noted for the manufacture of rubber goods, and *Springfield* for farming machinery.

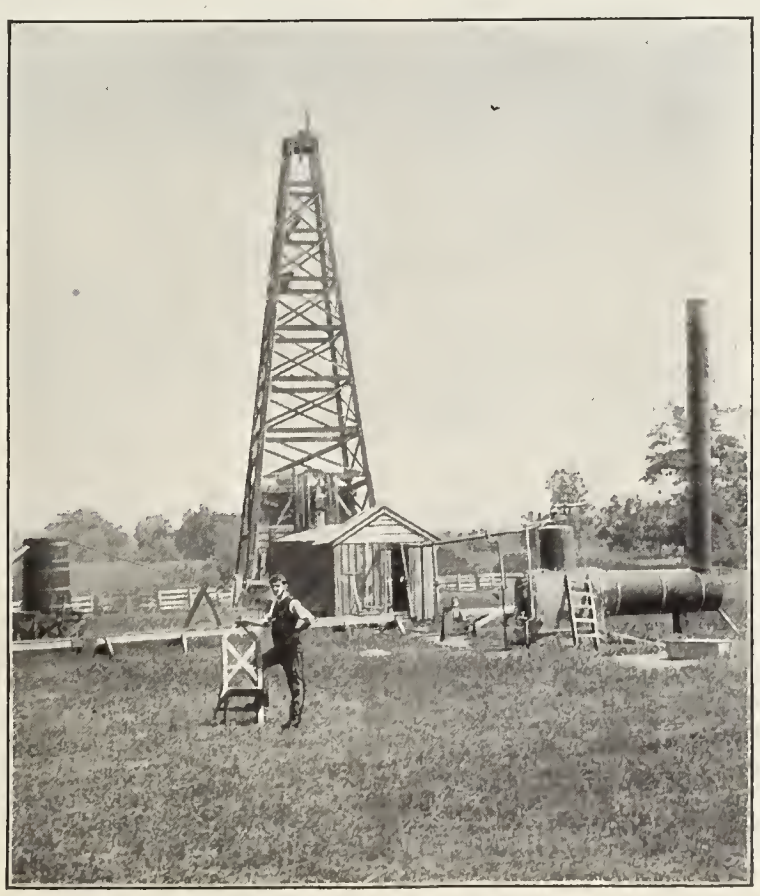
Indiana. What states border Indiana? What rivers are on the boundary? What tributary of the Ohio drains most of the state? Locate the capital; two cities in the northern part of the state; two in the southern part.

Indiana stands very high both as an agricultural and as a manufacturing state. In the state is found an abundance of coal (map, p. 52), natural gas, and petroleum. In order to pass south of Lake Michigan, most of the great east and west railroads of the country cross this state; and the Ohio and Wabash rivers are natural routes of commerce.

Indianapolis, an important railroad center, has an immense domestic trade. A belt railroad encircles the city and connects all the centering lines with the packing houses, grain elevators, flour mills, stock yards, and machine shops.

Evansville, the chief shipping port of southern Indiana, has flour and lumber mills. *Fort Wayne* has extensive car and machine shops. *Terre Haute*, at the head of navigation on the Wabash, has large distilleries. *South Bend* manufactures carriages and wagons, and farming machinery.

Illinois. What states border Illinois? Name the boundary waters. Compare the extent of lake coast with that of Indiana. Trace the Mississippi-St. Lawrence divide through the state. Name three tributaries of the Mississippi. Name the capital; the great lake port; two cities on the Mississippi River; three other cities. How can a cargo of grain go from Chicago to the Atlantic ports?



Petroleum Well, Indiana.

Illinois is in the heart of the corn, wheat, and stock-raising region, and is one of the greatest food-producing states of the Union. The middle coal field underlies almost the entire state, and, by supplying cheap fuel, enables Illinois to take high rank as a manufacturing state.

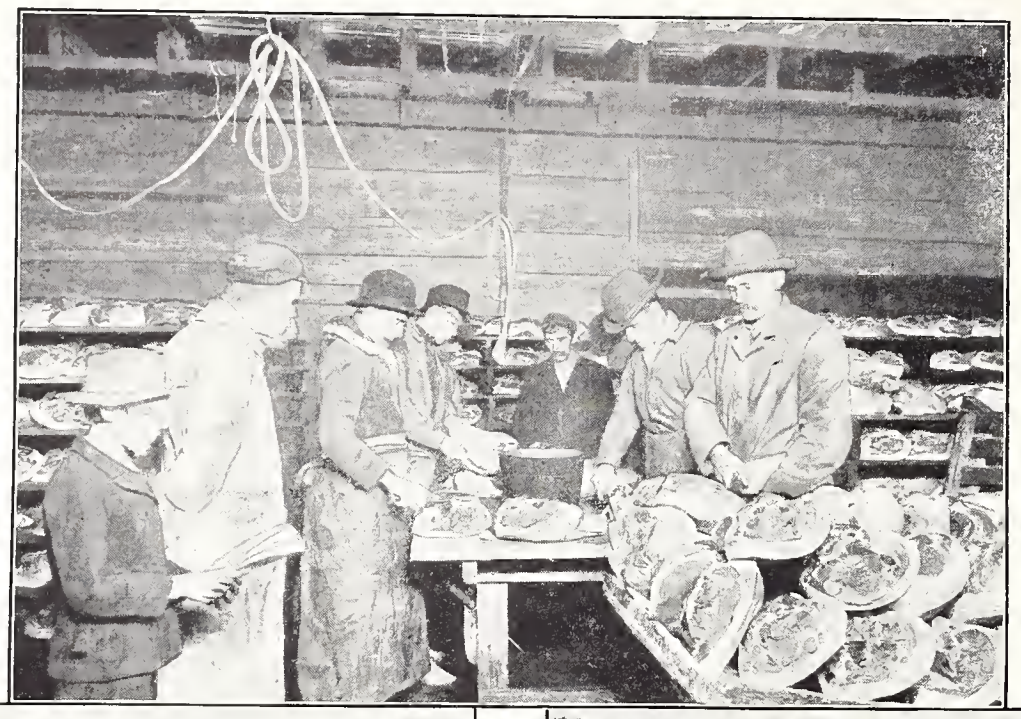
The railroad system is extensive, and the state is traversed by a navigable water route connecting the Mississippi River with Lake Michigan by way of the Illinois River.

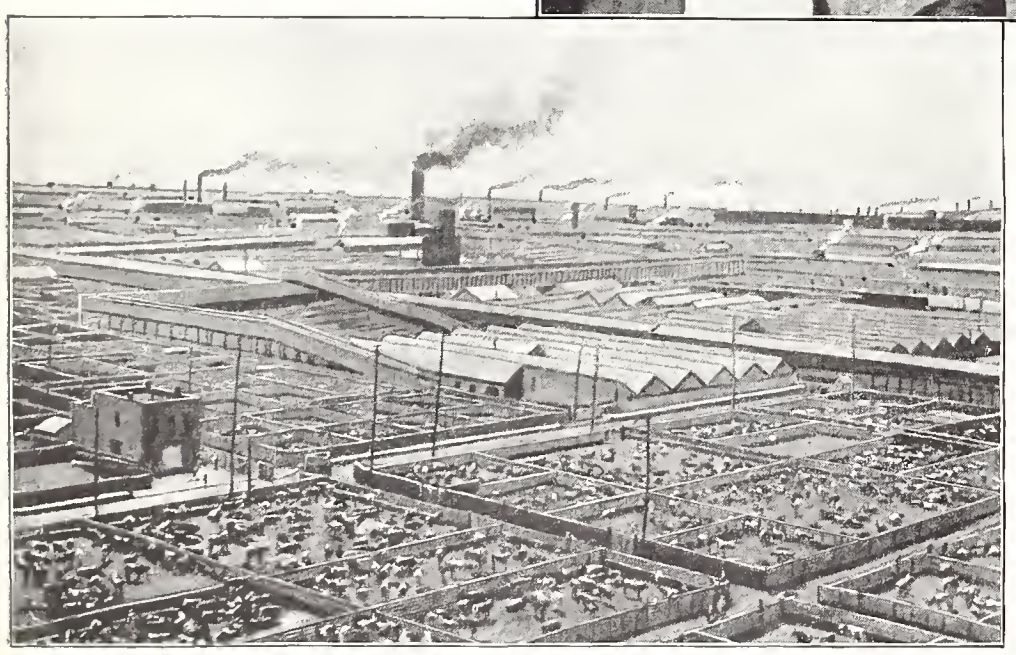
Chicago is the largest city on the continent, except New York, and it is the greatest market in the world for meat and grain. It is at

the mouth of Chicago River, which forms the harbor. The first houses there were built about a hundred years ago, and the city has grown very rapidily. It now extends twenty-five miles along the lake front and several miles back over the prairies. It contains about two million people.

Chicago is in the center of the greatest grain and stock-raising region of the world, and the forests of the north are easy of access. There is an ample supply of coal in the region just south of the city, and from the shores of Lake Superior is received the best of iron ore. Freight may be carried on the Great Lakes and canals to the Atlantic seaports of New York and Montreal, or by railroads which enter the city; for Chicago is the greatest railroad center in the world. As a result, Chicago is not only a great commercial city but a great manufacturing center. Thousands of cattle

MEAT PACKING, CHICAGO.





STOCK YARDS, CHICAGO.

and hogs are killed every day in the stock yards, and vast quantities of beef, pork, and other manufactured animal products are sent to all parts of the country. Tanneries take the hides and convert them into leather, and mills change the timber of the North into planed lumber, furniture, railroad cars, and agricultural implements. Steel rails and beams, machinery, clothing, books, and electrical goods are manufactured extensively.

The University of Chicago, though one of the youngest universities, is one of the largest in the United States.

Peoria, on the Illinois River, has great distilleries, stock yards, meat-packing establishments, and machine shops. *Quincy* is a large trade center, and has flour mills, breweries, and foundries. *Springfield*, the capital, is an important coal-mining center. *Rockford* manufactures furniture, knit goods, and machinery. *East St. Louis* is a railroad and manufacturing center. *Joliet* has great iron and steel works and quarries.

Kentucky. Bound Kentucky. What three rivers form much of its boundary? Name the principal rivers. Locate the capital; four important cities.

Kentucky produces about one third of the tobacco raised in the whole country, but corn is the most valuable crop. Hemp and sorghum are also characteristic crops. Much live stock is raised, especially fine horses. Kentucky has iron and coal mines and fine hardwood forests. Mammoth Cave, in the central part of the state, is one of the largest caverns known.

Louisville, at the "falls," or rapids, of the Ohio, is a great tobacco market. A canal for steamers extends

STOCK FARM, KENTUCKY.

around the rapids. Great quantities of tobacco, cotton-seed oil, and liquors are manufactured.

Covington and *Newport*, opposite Cincinnati, are part of that center, industrially. *Lexington*, in the Blue Grass region, is noted for race horses and fine stock.

Michigan. By which of the Great Lakes is Michigan bordered? Locate the Strait of Mackinac; the St. Marys River and Canal; Lake St. Clair; the capital; two cities north of the capital; two west; two south and east.

In northern and central Michigan lumbering and mining are the important industries. The pine forests of Michigan have furnished to the whole section much of its building lumber, and from this state are also obtained about one third of the iron ore, copper, and salt produced in the country, and some coal. A greater amount

"Soo" Canal, Michigan.

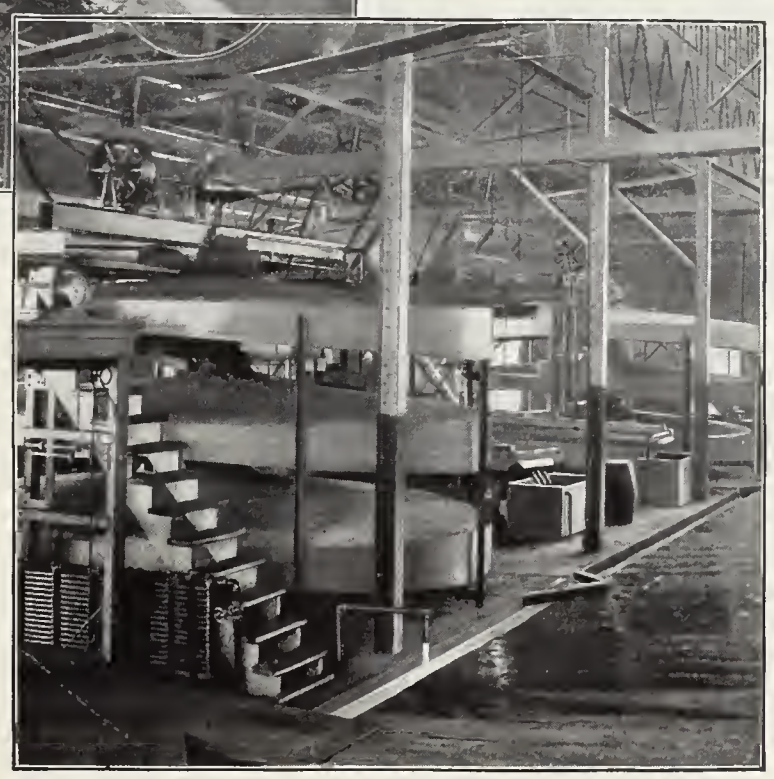
of freight passes through the St. Marys, or "Soo," Canal than through any other canal in the world.

The chief occupation of southern Michigan is agriculture, the state taking a high rank in the yield of dairy products, potatoes, sugar beets, fruits, and wool.

Detroit is one of the oldest cities in the Central Lowland, having been founded by the French from the lower St. Lawrence valley more than two hundred years ago. It has extensive transportation facilities by both water and rail, and has become a great commercial and manufacturing center. The chief manufactures are cars, machinery, tobacco, drugs, and iron and steel.

Grand Rapids has the best water power in the state, and is especially noted for the manufacture of furniture. *Saginaw* is the center of the beet sugar and coal-mining industries, and with *Bay City* is engaged in the lumber trade and the manufacture of salt. *Kalamazoo* is the center of a great celery-producing region, and *Jackson* is a railroad center.

Ann Arbor is the seat of the famous University of Michigan.



Copper Mill, Michigan.

Wisconsin What states border Wisconsin? What rivers and lakes form part of its boundary? Name three tributaries of the Mississippi River; one of Lake Michigan. Locate the capital; three cities on Lake Michigan; three other cities.

Northern Wisconsin is covered with valuable pine forests, and contains rich deposits of iron ore. In the southern part of the state dairying is a large industry, and grain, potatoes, and tobacco are important crops. An important water route between Lake Michigan and the Mississippi, by way of the Fox and Wisconsin valleys, crosses the state.

Milwaukee, like Detroit, occupies the site of an old Indian town, whither white men came early to trade for furs. It is an important shipping port for grain and lumber, and has extensive machine shops, breweries, tanneries, iron and steel works, and flour mills.

Superior ships wheat, iron ore, and lumber, and receives great quantities of coal. It has important flour and lumber mills, shipyards, and iron foundries. *Racine* has a large commerce on the lake, and manufactures agricultural machines. *Oshkosh* and *La Crosse* are centers of the lumber trade, and La Crosse has a large flour-milling industry. *Madison*, the capital, is the seat of the large state university. *Sheboygan* has furniture factories.

Supplemental Work. Read chapters 20, 22–25, 30, "Carpenter's Geographical Reader, North America." Describe, as fully as Chicago is described, one other city in the section.

States of the Missouri Basin. The seven states of the Northern Section west of the Mississippi River are sometimes called the "West Central States." Name them (map, p. 60). Which of them lie partly or wholly in the Missouri basin? Through these states trace the divide between the Gulf slope and the St. Lawrence and Hudson Bay slopes. Which state is in all three of these slopes?

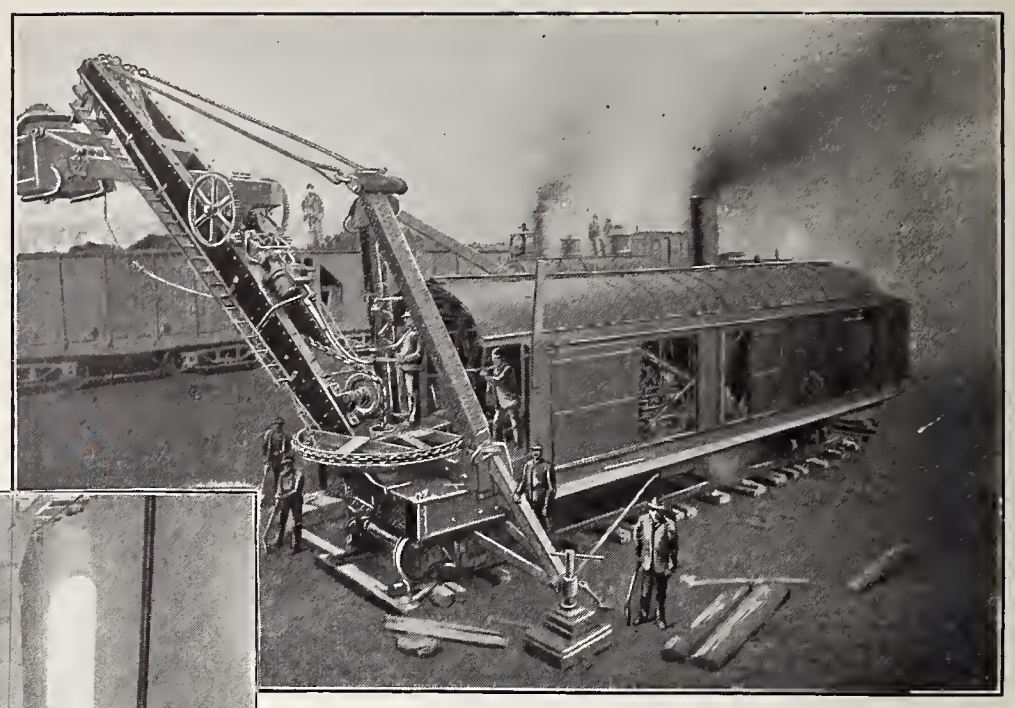
The high western portion of this group affords excellent pasturage for cattle, but it is subject to droughts which render farming uncertain except by the aid of irrigation. The lower eastern portion, however, has ample rainfall and great fertility, and yields about half of the grain and meat product of the country. This group of states produces nearly all the flaxseed (from which linseed oil is made) raised in the United States.

Minnesota. Give the boundaries of Minnesota. What three great river systems have their headwaters in this state? Which system drains the greater part of the state? Locate the capital; three other cities.

Shipping Iron Ore, Superior, Wis.

Minnesota is one of the foremost wheat-producing states. Wheat is raised in all parts of the state, but especially in the flat valley of the Red River. During the glacial period most of this valley was a vast lake, upon the bottom of which was deposited the sediment that forms the fertile soil and level surface of the present wheat fields.

In the Mesaba and Vermilion ranges in the northeastern part of the state are found some of the richest and most extensive iron mines in the world.



Loading Iron Ore, Minnesota.

More than half of the state is forest-clad, — with pine in the north and with oak and other hard woods in the southeast, — and lumbering is an active industry.

Flour Mill, Minneapolis, Minn.

Minneapolis, at the Falls of St. Anthony, and *St. Paul*, at the head of navigation on the Mississippi River, though separate cities, really form a single center of population and one of the ten greatest manufacturing and commercial centers in the country. Minneapolis is the greatest flour-milling city in the world, and lumber milling is also very important, the water power of the falls being largely utilized in both industries.

Duluth, with the city of Superior opposite, forms another center of population. It has large lumber mills, and a fine harbor with great docks and elevators. It is at the eastern end of a railroad to the Pacific, and at the head of navigation on the Great Lakes, and ships wheat, flour, lumber, iron ore, and copper. *Winona* has a large trade in lumber and wheat.

Iowa. Bound Iowa. What rivers form part of its boundary? Which three states of the Northeastern Section are within the parallels that bound Iowa? How does Iowa compare in area with these three states? Locate its capital; four cities in the east; two in the west.

Iowa is one of the greatest agricultural and stock-producing states in the Union. All kinds of farm produce are raised in great quantities, particularly corn, oats, hay, poultry, eggs, and dairy products. Much bituminous coal is mined.

Thrashing Wheat, Iowa.

Des Moines, the capital, is an important railroad and trade center in a mining and rich grazing region. Medicines, flour, and machinery are manufactured.

Dubuque has lumber mills, breweries, and carriage factories. *Sioux City* has large meat-packing establishments. *Davenport*, with Rock Island and Moline opposite, forms an important center of trade. It is a great grain market, and manufactures machinery and packed meat. *Cedar Rapids* is a busy trade center. *Burlington* and *Council Bluffs* are important river ports.

Missouri. What states border Missouri? What rivers form part of the boundary? What mountains are in the state? Locate its capital; its five chief cities.

The raising of grain, sorghum, cattle, and hogs is the chief occupation on the rolling prairies of the northern half of the state. In the forest-covered plateau of the Ozark Mountains the production of fruit and wool, and lumbering, are important industries. Much coal is mined in northern, central, and western Missouri, and much zinc and lead in the southwest corner of the state.

St. Louis is the largest city in the Mississippi basin, and is exceeded in population by but three cities in the Union. Situated on the Mississippi River between the mouths of the Missouri and Ohio, it has admirable facilities for river transportation to all parts of the Mississippi basin. With the building of railroads and the development of the Mississippi valley, it has become a great railway and manufacturing center. It is one of the chief commercial cities of the country, and the principal collecting and distributing point for much of the southwestern quarter of the United States.

Kansas City is an important receiving and distributing point for a large region to the west. It is continuous with Kansas City, Kansas. *St. Joseph* is

CORN FIELD, KANSAS.

noted for meat packing and flour milling. *Joplin* is a mining center. *Springfield* has important flour mills and a large local trade.

Kansas. What states border Kansas? What can you say of the altitude of the state? Name its two chief rivers; its capital; three other cities.

The surface of Kansas is a long, gradual slope, the western boundary being about half a mile higher than the eastern. The rainfall in the east is sufficient for very successful farming. The west is drier, but affords excellent pasturage for cattle (§ 130). Kansas ranks among the leading states in the production of corn, wheat, cattle, horses, and hogs. There are important coal, zinc, and lead mines and petroleum wells in the eastern part of the state, and salt mines in the central part.

Kansas City is continuous with Kansas City, Missouri. In slaughtering and meat packing, its leading industry, the city ranks next to Chicago. *Topeka*, the capital, has large flour mills. *Wichita* is in a wheat-growing and stock-raising region. *Leavenworth* is in a coal-mining region of northeastern Kansas.

Nebraska. What states border Nebraska? How does Nebraska resemble Kansas in surface? in drainage? What river forms its eastern boundary? What tributary of the Missouri drains most of the state? Locate the capital; one other large city.

Nebraska, like Kansas, lies on the long, gradual slope west of the Missouri River, down which the wide, shallow tributaries of that stream flow in broad valleys. In the west, cattle herding is the chief industry; in the east, farming. Explain this difference.

Omaha and *South Omaha* in Nebraska, with Council Bluffs in Iowa, form a single center of population, commerce, and manufacturing. There are very large meat-packing establishments, extensive breweries, and smelting and refining works.

BEET SUGAR FACTORY, NEBRASKA.

Lincoln, the capital, is a trade center, with a large distributing business in coal, grain, and live stock.

South Dakota. What states border South Dakota? In what part of the state is the greatest elevation of land? What river drains nearly the whole state? Locate the capital and chief cities.

South Dakota has a more uneven surface than either Kansas or Nebraska. In the east are hills of glacial drift, and near the western boundary there is a cluster of mountains called the Black Hills. Here gold and silver are mined and a low grade of tin ore is found. In the eastern part of the state wheat and flaxseed are important crops.

Sioux Falls has fine water power, and is the railroad center of the state. *Lead* is a mining center in the Black Hills region.

North Dakota. What states and country bound North Dakota? What river boundary has it? What three states does it resemble in surface? In what two drainage slopes does North Dakota lie? Trace the divide between them. Locate the capital and chief cities.

Much of North Dakota east of the Missouri is covered with glacial drift. Here also is part of the fine Red River wheat region (p. 70). Some of the wheat farms are thousands of acres in extent. Much flaxseed is raised, and stock raising is an important industry.

Fargo, at the head of navigation on the Red River, is the center of several railroad lines. *Grand Forks* is in the rich wheat region.

Supplemental Work. Read chapter 21 of McMaster's "School History of the United States," and tell some anecdote connected with the history of this section. Read chapter 21, "Carpenter's Geographical Reader, North America." Describe, as fully as St. Louis is described, one other city in the section.

FARM, NORTH DAKOTA.

THE SOUTHERN SECTION

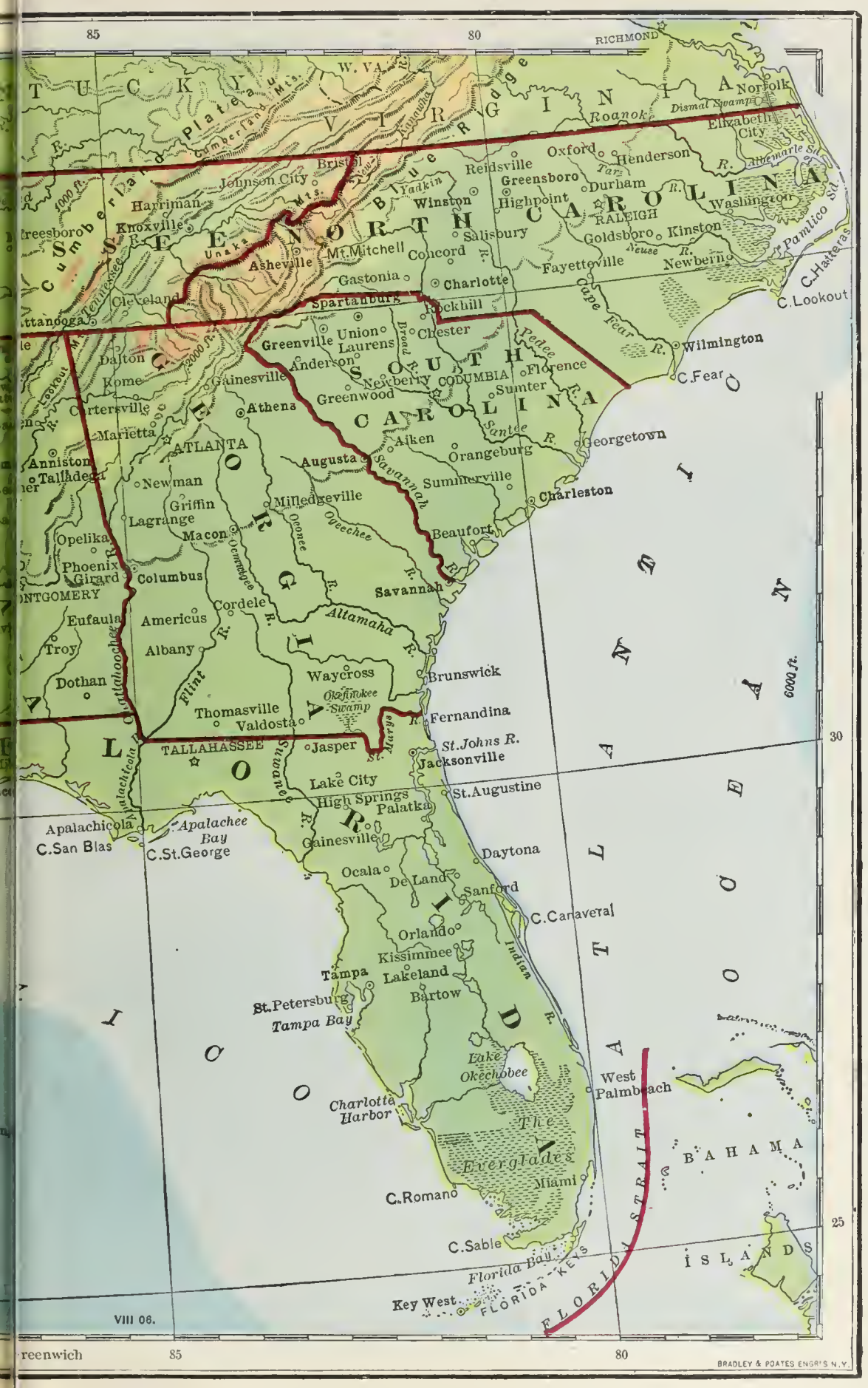
Which part of this section is highland? Which part is lowland? Which states contain part of the Appalachian Mountains? Which states lie partly or wholly in the Atlantic plain? Which lie partly or wholly in the Gulf plain? Which are broken by the Ozark Mountains? Which lie partly in the Great Plains? Which quarter of the United States embraces most of the Southern Section?

Near the coast the surface of this section is rather flat; then occur the low Piedmont hills in the east, and gently rolling plains in the west. The surface is rugged only near the Appalachian and Ozark ridges and near the mountains in the extreme west. The soil, though sandy toward the coast, is generally very fertile.

Long, hot summers and short, temperate winters prevail over nearly the whole of the section (map, p. 47). Although snow sometimes falls in every state, it soon melts. Over nearly the whole section the rainfall is abundant for purposes of farming. It is only in the extreme west that serious droughts occur.

Agriculture is the great industry, and cotton is by far the most important crop (map, p. 51), one fourth of the farm land being devoted to its cultivation. This section is the world's greatest cotton-producing region.

Most of the ordinary or "upland" cotton is grown in a broad belt lying about one hundred miles from the coast, and stretching from Texas to North Carolina, with extensions up the valleys of the larger rivers. The finest cotton, however, — that with the longest and toughest fiber, — comes from the sea islands along the Atlantic coast.



Coal is extensively mined in the Appalachian and Ozark regions of this section (map, p. 52), and the southern end of the Appalachians has become a great iron-mining district.

From the city map on p. 53, how do you think this section compares with the northeastern quarter of the country as a manufacturing region?

Formerly nearly all the labor in the Southern Section was done by negro slaves, who could do farm work, but had not been trained to manage machinery; so very little manufacturing was then done in the South, nearly all the manufactured goods used there being brought from abroad or from the North in exchange for raw cotton. Since the negroes were freed, however, many white people have turned their attention to manufacturing and mining, which have now become important industries in the South.

The manufacture of cotton cloth is rapidly increasing, especially in the eastern part of the section; and the extraction of oil from cotton seed has become an important industry in the central and west central parts. Sugar is made in the Mississippi delta; iron and steel are manufactured in the iron-mining region; and there are many sawmills in the forest regions, and turpentine distilleries in the great pineries of the Southeast.

The coast of nearly the whole section is fringed with barrier beaches (§ 66, p. 17), and many of the inlets are narrow and obstructed by shifting bars. In consequence foreign commerce has not been greatly developed, though much cotton and some grain, coal, and lumber are exported, and there is an active coasting trade in small vessels.

The railroad map (p. 53) shows that the railroads of the section are separated by the Appalachian Mountains into two groups. These two groups are connected by several lines which cross the Appalachians or pass around their southern end. Each group, however, indicates the chief routes taken by trade in its region: the Atlantic plain trading mostly with the northeastern part of the country, but the Southwest and lower Mississippi valley mostly with the great central prairie region.

From the population map (p. 49), tell how the density of population in this section compares with that in the northeastern quarter of the country. The Southern Section contains about one fourth of the people in the United States. There are not many foreigners; but about one third of the people are negroes, and in several of the states the negroes are more numerous than the whites.

Corn is grown in nearly all parts of the section except in the extreme west, and, with sweet potatoes, it is the chief food crop. In the northern part much tobacco and some wheat are raised; in the southern part, sugar cane, rice, and oranges. The peach crop of the section is very large. Hogs are raised in most parts of the section, fine horses in the north, and many cattle in the west.

In the northern part of the section, especially in the valleys of the Appalachian and Ozark Mountains, are extensive forests of oak, hickory, ash, poplar, and cottonwood (map, p. 52). The forests of the coast plain are composed chiefly of yellow or southern pine. These forests yield valuable building lumber, and from the abundant sap of the pine trees are made great quantities of naval stores — pitch, rosin, and turpentine.

North Carolina. What states border North Carolina? To what two slopes does its drainage belong? Trace the Fall line between the Piedmont and Tidewater regions (p. 43). Name the principal rivers. Name two mountain ranges; a mountain peak. Locate the chief sounds; three capes. What part of the state is swampy? Locate the capital, a city near the coast; four other cities.

MAKING ROSIN, SOUTH CAROLINA.

INTERIOR OF TOBACCO FACTORY, NORTH CAROLINA.

The forest-covered mountains of the western part of the state yield valuable hardwood lumber. In the Piedmont region corn, cotton, tobacco, and wheat are raised. Much of the Tidewater region is swampy or covered with open pine forests, where turpentine and rosin are produced. Rice, peanuts, sweet potatoes, and early vegetables are important crops in the light sandy soils of this region.

The manufacture of cotton is increasing rapidly, the mills already consuming more cotton than is raised in the state. Other important industries are lumber milling, and the manufacture of tobacco, flour, and cottonseed oil.

Wilmington, an important cotton market, is the chief seaport of the state, from which great quantities of lumber and naval stores are shipped. *Charlotte* is a great cotton-manufacturing center. *Asheville*, the commercial center of the western part, is a famous health resort. *Raleigh*, on the Fall line, has important cotton mills and tobacco factories. *Greensboro* and *Winston* have large tobacco factories.

South Carolina. Between what two states is South Carolina? What river separates it from Georgia? Describe the surface. Which are its two largest rivers? Locate the capital; the other chief cities.

More than one third of the cultivated land of South Carolina is devoted to cotton. The swampy Tidewater region yields much rice, the state ranking second in the Union in this product. The cultivation of early fruit and vegetables for the Northern markets is an important industry. From the pine forests lumber and naval stores are obtained. Phosphate rock, much used as a fertilizer, is dug in the Tidewater region. Cotton weaving, lumber milling, rice cleaning, and making fertilizers and cottonseed oil, are the chief manufacturing industries.

Charleston, one of the leading cities of the South, owes its prosperity largely to its fine harbor. The first engagement of the Civil War took place at Fort Sumter in this harbor. Much cotton, rice, lumber, and fertilizers are shipped from this port.

Columbia, the capital, is on the Fall line. Its fine water power is used by several large cotton factories. *Greenville* and *Spartanburg* manufacture cotton cloth.

Georgia. What states border Georgia? What rivers form part of the boundary? What are the chief rivers of Georgia draining the Atlantic slope? the Gulf slope? What part of the state is drained by the Mississippi system? Trace the divides of these three slopes. Where is Okefinokee Swamp? Locate the capital; the other chief cities.

Georgia, one of the leading cotton-growing states, also produces large crops of corn, sweet potatoes, peaches, and melons, besides some sugar and rice. The pine forests yield much lumber, and more turpentine and rosin than any other region in the world. There are valuable quarries of marble and granite in the north. Georgia is a leading state in the production of marble. There are coal and iron mines in the mountains of the north. The fine water powers along the Fall line give Georgia a high manufacturing rank among the Southern states. The chief manufactures are cotton, lumber, flour, naval stores, and cottonseed oil.

Atlanta, the capital, has grown rapidly and is one of the greatest commercial cities and railroad centers of the South. It owes its prosperity largely to its location near the southern end of the massive Blue Ridge, where communication is easy with the North and with both the eastern and the western group of Southern railroads. It has cotton mills and many other manufactories.

Savannah was the first place settled in the state. Though eighteen miles from the ocean, it has one of the deepest harbors on the Southern coast. The first steamship to cross the Atlantic sailed from this port. Savannah ships much cotton, rice, and lumber, and more naval stores than any other port in the world.

SHIPPING COTTON, SAVANNAH, GA.

STEEL WORKS, NEAR BIRMINGHAM, ALA.

A LOAD OF COTTON, VICKSBURG, MISS.

Augusta, *Macon*, and *Columbus*, on the Fall line, have many cotton mills. *Athens* is an educational center and an important cotton market. *Brunswick* is a shipping port of growing importance.

Florida. What states border on Florida? What waters? Name its chief bays; capes; rivers. Trace the main divide. Which slope embraces the greater part of the state? Locate the capital; the four chief cities.

The surface of Florida is everywhere low and flat, and the sluggish streams have numerous lakelike expansions. The southern part of the peninsula has been formed by additions to the mainland of successive lines of coral reefs, or *keys*, that grew up in the warm, shallow water along the coast (§ 67, p. 18). This part of the state is even now mostly a great marsh called "the Everglades."

The raising of early vegetables and fruits, especially oranges, is an important industry. The manufacture of cigars, lumber, and naval stores is also important. Phosphate rock is mined and exported. The mild climate has made the state a favorite winter resort for invalids.

Jacksonville, the business center of the state, exports lumber and oranges, and is a popular winter resort. *Pensacola* is engaged chiefly in shipping lumber. *Tampa* is an important shipping point for southern Florida and has cigar factories. *Key West*, the most southerly city in the Union, manufactures cigars from Cuban tobacco, and exports sponges.

St. Augustine is the oldest town in the United States, and contains fine hotels for winter guests.

Alabama. Bound Alabama. Trace the main divide of the state. What rivers drain most of the southern slope? Into what bay do they flow? What river drains the northern slope? Into what does it flow? Locate the capital; the other chief cities.

Southern Alabama is a flat region of pine forests, where lumbering is the chief industry. The central and northwestern parts are rolling or hilly, and produce cotton, corn, and other crops. Among the Appalachian ridges of the northeast more coal is mined than in any other Southern state, and more iron ore than in any other state except Minnesota and Michigan. Iron and steel can be made there so cheaply that Alabama has become the fourth state in the Union in their manufacture.

Mobile, at the head of Mobile Bay, is the oldest city in the state. It is a great cotton-shipping port, and has large lumber mills. *Birmingham* and *Anniston* are in the mining region, and have many iron furnaces and rolling mills. *Montgomery*, the capital, is an important trade center.

ORANGE TREE, FLORIDA.

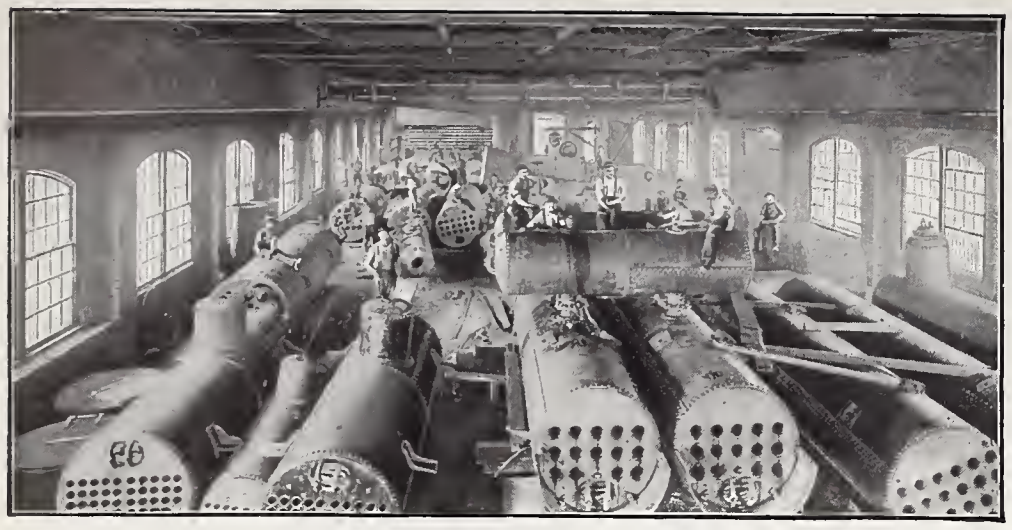
Mississippi. What states border Mississippi? What water boundaries has it? What river in the western part of the state is really a large bayou (§ 53) of the Mississippi? By what river is the extreme northeastern part of the state drained? Locate the capital; the chief cities.

The broad, low flood plain of the Mississippi includes all the part of the state between that river and the Yazoo, and is one of the most fertile regions of the Union. The uplands farther east are also very fertile. More than half the land under crops in Mississippi is devoted to cotton raising. Lumbering is also an important industry in the south. On the Gulf coast are several seaside resorts.

Vicksburg is a cotton market and the largest city of the state. *Meridian* is the commercial center of eastern Mississippi. *Natchez* ships much cotton.

Tennessee. What states border Tennessee? What is its western boundary? its eastern? What plateau crosses the state? This is one of the Allegheny plateaus. What tributaries of the Ohio cross the state? Compare the slopes of the eastern and western parts of the state as indicated by these rivers. Locate the capital; the other chief cities.

Tennessee is divided into three regions by the Tennessee river and the Cumberland plateau. Cotton growing is confined chiefly to the low western region. Much corn, tobacco, wheat, fruit, vege-



Boiler Shop, Chattanooga, Tenn.

tables, and fine stock are raised in the beautiful farming region of middle Tennessee. East of the plateau lumbering and the mining of coal and iron are important industries. Beautiful variegated marble is quarried in east Tennessee, and phosphate rock in middle Tennessee.

Tennessee is one of the leading Southern states in the production of flour, lumber, iron and steel, tobacco, and cottonseed oil.

Memphis is situated on a bluff overlooking the Mississippi River, high above the floods that are common in this part of its course. Because of its safety from overflow, Memphis rapidly grew to be an important river port, and since the building of a great railroad bridge here across the river it has become an important railroad center. It has a large trade in cotton, and many machine shops, and is an important manufacturing center for lumber and cottonseed oil.

Nashville, the capital, was founded at a salt spring where wild game came to lick the salt-incrusted rocks. From a famous hunting post, it soon became an important trading point because of its river route to the lower Mississippi and the upper Ohio. With the building of railroads it became an important commercial city. Flour and fertilizers are among its manufactures.

Knoxville, the trade center of eastern Tennessee, has foundries, rolling mills, and flour mills. *Chattanooga* is in the region where coal and iron ore are mined, and manufactures iron and steel. Being near the gorge which the Tennessee River has cut through the Cumberland plateau, it has become an important railroad center. *Jackson* is the center of a considerable trade.

Arkansas. Bound Arkansas. What great tributary of the Mississippi flows through it? Name the mountains. In what direction does the state slope? Locate the capital and other chief cities.

Nearly one half of the state is occupied by the broad flood plains of the Mississippi and Arkansas rivers, and these produce great crops of cotton, corn, and peaches. From the forest-covered uplands valuable hardwood timber is obtained. Cottonwood and cypress grow in the lowlands. Coal and fine sandstone for whetstones are obtained from the rock folds in the western part of the state. South of the Ozark ridges, in the region of folded rocks, occurs a group of very celebrated hot springs.

Sawmill, Arkansas.

Little Rock, the capital, has manufactures of cottonseed oil and lumber. *Fort Smith* is the center of the coal region. *Pine Bluff*, on the bluff forming the western margin of the great Mississippi flood plain, is a shipping point for cotton and lumber. *Hot Springs*, a town of hotels, is a famous health resort.

Louisiana. What states border on Louisiana? What waters? In what general direction does its surface slope? What is the largest tributary of the Mississippi in the state? What bayou flows to the Gulf from near the mouth of the Red River? Because of this bayou the mouth of the Red River is sometimes said to be the head of the Mississippi delta. What lake or arm of the Gulf is in the southeastern part of the state? Locate the capital; the chief city; one other city.

Sugar Works, Louisiana.

Fully half of the state lies in the low flood plains of the Mississippi and Red rivers. These are protected from overflow by levees (p. 45) and produce great quantities of sugar cane and rice — far more of each than is produced in any other state. Much of the uncultivated surface is covered with canebrakes and swampy forests. Cotton growing is confined largely to the uplands. Rich petroleum fields, recently developed in the southwest, have started a new industry in the state. The chief manufactures are refined sugar, lumber, and cottonseed oil.

New Orleans, the largest city of the South, is on the Mississippi River, about one hundred miles from its mouth. Ocean vessels ascend to the city to receive the cotton, wheat, and other freight that comes down the river or by rail from all parts of the Mississippi valley.

Owing to these unrivaled natural advantages for commerce, New Orleans has become one of the great cities of the country and one of the greatest cotton-shipping points

in the world, in spite of certain disadvantages of location. Most of the city between the river and Lake Pontchartrain is so low that, to protect it from overflow, it is surrounded by levees, over which the drainage and sewage is pumped into Lake Pontchartrain.

Sailing vessels reach the heart of the city by the lake and canals, but steamers generally use the river, especially since the deepening of one of the river mouths by means of artificial banks called *jetties*.

Shipping Cotton, Houston, Tex.

Much sugar is made and refined in New Orleans.

The city and the state were settled by the French, and many descendants of these settlers still live there and speak the French language.

Shreveport is a cotton market. *Baton Rouge*, the capital, is built on a bluff above the river.

Texas. Bound Texas. Describe the surface and its general slope. Trace through the state the divide of the Mississippi basin. Mention three rivers south of this divide. How does Texas rank among the states of the Union in area? (map, p. 50.) Describe the coast. Name the bays. Locate the capital; four cities in the south; three cities north of the capital; one city in the west.

Texas is by far the largest state in the Union. Its surface in general is a smooth slope, descending from the dry plateau and mountain ranges of the extreme west.

The warm, moist lowlands have valuable forests and rich petroleum fields, and produce sugar cane and more cotton than any other state. The higher, cooler, and drier central prairie region produces good crops of wheat, corn, and fruit; and on the pastures of this region and of the Great Plains farther west are raised great numbers of cattle, horses, mules, and sheep. Texas is one of the great manufacturing states of the South; lumber milling, flour milling, and the making of cottonseed oil being the chief industries.

Many of the people of Texas are of Spanish-Mexican descent.

San Antonio is a great market for live stock, wool, and hides, and a growing health resort. *Houston* is an important railroad and commercial center in the southern part of the state, as also are *Dallas* and *Fort Worth* in the north. *Galveston*, the chief seaport, is one of the greatest cotton shipping points of the world. *Austin*, the capital, and *Waco* are important trade centers. *El Paso* is a railroad center and a health resort. *Laredo* is a commercial center.

Oklahoma. Bound Oklahoma. What river crosses the state and receives most of its drainage? What river forms part of its southern boundary? Describe the surface and its general slope, in comparison with that of Texas. Locate the capital; three other cities.

Oklahoma was the last state in the Union to be settled by white men. For more than half a century this region was called Indian Territory, and was set aside as a home for Indians removed from other parts of the country. About one fifth of the Indians of the United States now live in Oklahoma, mostly in the eastern part of the state; many of them are civilized and progressive citizens. It was in 1889 that the first part of Oklahoma was opened to white settlers, and since then the population has grown very rapidly. There are now about as many negroes as Indians, and more than ten times as many whites.

Most of Oklahoma is an undulating plain which gradually increases in elevation towards the west; but in the south and east there are some low mountains. The soil is very fertile and produces large crops of corn, cotton, wheat, and fruit. There is much excellent pasturage, and stock raising is carried on extensively. Flour and cottonseed oil are the chief manufactures. Bituminous coal and petroleum are obtained in the eastern part of Oklahoma, and granite in the southwest.

Guthrie, the capital, *Oklahoma*, *Muskogee*, and *Ardmore* are important trade centers.

Supplemental Work. Read chapters 13–19, "Carpenter's Geographical Reader, North America." Describe, as fully as New Orleans is described, one other city or place in this section.

Cattle Raising, Oklahoma.

PLATEAU SECTION

Scale 133 miles to one inch; same as the maps of Northern Section, Southern Section, Pacific Section, British Isles, Central Europe, and Southwestern Europe

SCALE OF MILES

0 50 100 150 200 250

The highlands above 2000 feet are shown in the buff tints, the lowlands above sea level in the green tints, and the lowlands below sea level in the purple tint.

120 115 110 105 100

45 40 35

115 Longitude West from 110 Greenwich 105

BRADLEY & POATES ENGR'S N.Y.

CTY. FARQUHAR DEL.

THE PLATEAU SECTION

Which states of the Plateau Section are crossed or bordered by the Rocky Mountains? Which states lie partly in the Great Plains? Which states lie partly in the Columbia plateaus? (map, p. 42.) Which lie partly in the Colorado plateaus? Which lie partly in the Great Basin? Which half of the Union embraces this section? How does the rainfall in this section compare with that in the eastern half of the Union? (map, p. 48.)

This is the highland section of our country. In general the surface is about a mile high, but the mountain ranges and many of the plateaus are much higher. Practically the only lowland in the section is in the extreme southwest.

The Rocky Mountains extend from northwest to southeast through the central part, making this the most rugged part of the United States. Except in the extreme north and south, the lowest passes across this chain have an elevation greater than the highest points of the Appalachian Mountains, and very many of the peaks reach heights of over two miles, where it is too cold for vegetation to grow.

East of the mountains the section embraces a wide belt of the smooth but elevated surface of the Great Plains. West of the mountains the plateau surface is much broken by deep canyons, by lines of cliffs many miles in length, and by numerous detached mountain ranges formed by tilted blocks (p. 46). Between these ranges, cliffs, and canyons, however, the plateaus are smooth and nearly level.

On the highland the summer days are usually hot, but because of the elevation the nights are cool. The winters in the north are long and very cold, but in the lowland of the south they are mild and almost snowless. In summer this lowland is one of the hottest parts of the United States.

Only on the mountain slopes and on the highest plateaus is there enough rainfall to support forest growth. Elsewhere the section is so dry that irrigation is necessary for successful farming. Much of the section, however, is covered with coarse grass, but in the Great Basin and southward are large desert tracts.

INDIANS OF THE GREAT PLAINS.

By far the most important industry is the mining of the metals silver, gold, copper, and lead. This section is one of the great silver-mining regions of the world, and it produces more than half of the gold, copper, and lead mined in the United States. Much of the lead is obtained from the silver ore. Enough coal to supply the wants of the section is mined from numerous small coal fields (map, p. 52).

PETTIT LAKE IN IDAHO.

Next to mining, herding is the most important industry. Large flocks of sheep pasture both on the Great Plains and on the high plateaus west of the Rocky Mountains. About half of the wool produced in the Union comes from this section. Herds of cattle also find pasturage on the Great Plains, and many are shipped east to be converted into beef.

Farming is confined mainly to lands that can be irrigated, either in the larger river valleys or where the waters from mountain streams can be led over the land. On such lands hay, grain, vegetables, and fruit are produced. In many parts of this arid region the Federal Government is building irrigating works.

On the lower slopes of the mountains, where there are forests, some lumbering is carried on.

The population of the section is very sparse (map, p. 49). There are not so many people in this whole section as there are in any one of a dozen single states in the eastern half of the country.

About one fourth of the Indians in the United States live in this section, and yet there are many more whites than Indians. The Indians live on *reservations* which the government has set apart for them, and within which no one else is allowed to settle.

Few railroads are necessary in a region so sparsely populated, and most of these are parts of transcontinental lines which connect the railroad systems of the East with the Pacific coast (map, p. 53).

Montana. Bound Montana. What part is most mountainous? Trace the continental divide across the state. What two great rivers are east of the divide? What two rivers are west? To what are they tributary? What lake is in the northwest? Locate the capital; the other chief cities.

Montana is one of the large states of the Union. More copper is mined in this state, more sheep are raised, and more wool is clipped than in any other state in the Union. The copper and much gold and silver are mined in the mountains. The great sheep ranges lie east of the mountains, where cattle are also raised; and hay, wheat, and oats are grown on extensive irrigated regions.

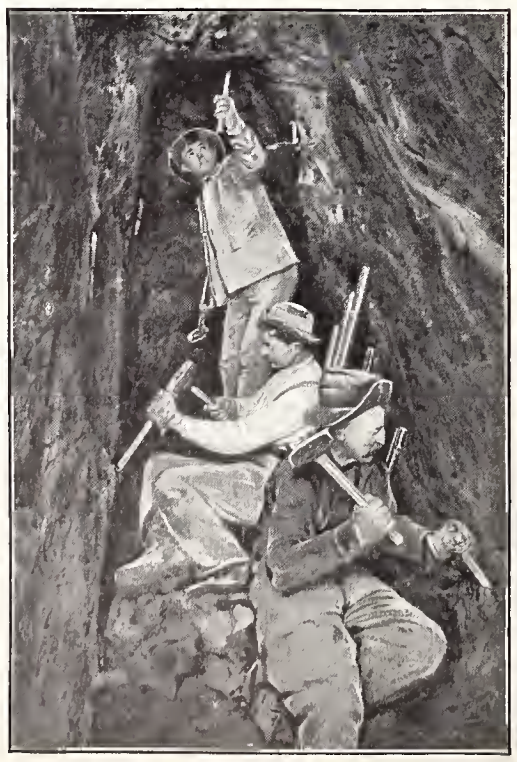
COPPER MINE, MONTANA.

Butte, the chief commercial city, is one of the great copper-mining centers of the world. At *Anaconda*, a few miles distant, are vast works for the reduction of copper ore. *Great Falls* has large smelting works and is an important wool-shipping point. *Helena*, the capital, is in the mining region.

Idaho. What states and country border Idaho? What river drains the southern part? What rivers drain the northern part? What part is mountainous? Locate the capital.

Mining is very important. Idaho has become one of the great lead-producing states in the Union; the yield of silver and gold is also large. In the north the rainfall is sufficient for the growth of wheat in the valleys and for fine forests on the mountain sides, so that both agriculture and lumbering are carried on. There are extensive irrigated regions in southern and southwestern Idaho. *Boise* is in an excellent grazing region.

Wyoming. What states border Wyoming? Trace the continental divide through the state. What three river systems have headwaters in this state? What are the chief mountain ranges? Name the capital; two other towns. Locate the Yellowstone Park.



IN A COLORADO GOLD MINE.

SHEEP READY FOR SHEARING, WYOMING.

Wool growing and coal mining are the chief occupations, though many cattle are also raised. Wyoming is the only state in the section where coal mines are more important than the mines of the metals. Yet silver and copper ores are smelted along the transcontinental railroad which crosses the southern part of the state.

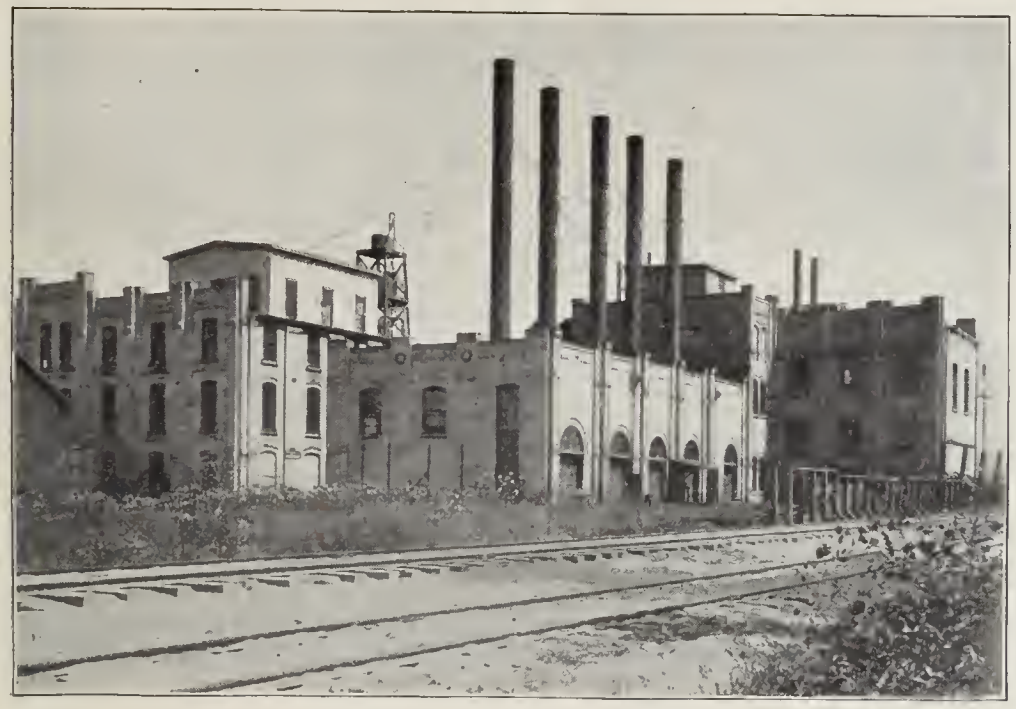
Cheyenne and *Laramie* are railroad towns and important collecting and distributing centers. *Rock Springs* is in the coal region.

The **Yellowstone National Park** has been reserved from settlement by the Federal government. It contains the most wonderful geyser region in the world. There are also hundreds of hot springs whose basins are composed of beautifully colored mineral deposits from the cooling waters (§ 43, p. 13). Besides these there are several lakes, the Great Falls and canyon of the Yellowstone River, and many lofty mountain peaks. The park is visited every year by travelers from all parts of the world.

Colorado. Bound Colorado. Trace the continental divide across the state. Name four mountain ranges. Locate four "parks" among the mountains; three mountain peaks. What great rivers have headwaters within the state? Locate the capital; the other chief cities of the state.

Colorado is the oldest state in the section and contains the largest population. It is one of the great silver-producing regions in the world, and it ranks as the first state in the Union in the production of gold and of lead. There are also valuable coal mines, and petroleum and iron ore are produced. Considerable crops of hay, wheat, fruit, and garden produce are raised, chiefly east of the mountains, and herding is important in the "parks." Many invalids resort to Colorado because of its dry, pure air.

Denver is the receiving and distributing point for a wide mining and herding region. It is the chief railroad center of the state, and the largest city of the



BEET SUGAR FACTORY, UTAH.

section, having grown very rapidly since the discovery of gold in Colorado, just before the Civil War.

Pueblo has easy access by way of the Arkansas canyon into the silver- and lead-mining region in the mountains, and is also convenient to regions where coal, iron ore, and petroleum are obtained. It has smelting works, rolling mills, and machine shops. *Colorado Springs* is a great health resort. Near by is the beautiful "park" called the Garden of the Gods. *Leadville* and *Cripple Creek* are famous mining centers.

Utah. Bound Utah. What mountain range traverses the center of the state? What river drains the eastern half of the state? What large lake is in the state? What is the history of this lake? (p. 46.) Locate the capital of Utah; three other cities.

West of the Wasatch Mountains the state lies in the Great Basin and part of it is desert, but in the valleys along the west base of the mountains considerable crops of hay, grain, and vegetables are raised by irrigation. Much wool is also produced. The lead-silver mines make Utah one of the great lead-producing states. Flour and beet sugar are manufactured.

Salt Lake City is the business center of the state. Water from the mountains is led through the city in pipes and open ditches. *Ogden* is a railroad center on a transcontinental line. *Provo City* and *Logan* are trade centers of fertile irrigated regions.

Nevada. Bound Nevada. What parts of the state are drained by rivers flowing into the Pacific? What becomes of most of the streams in the state? Name the chief lakes. Which have no outlets? Locate the capital; three other cities.

Nevada lies chiefly in the Great Basin, and much of it is arid and desert land. Only along the valley of the Humboldt River, and in some of the mountain valleys, is agriculture carried on. Gold, silver, and lead are mined.

Reno, on a transcontinental railway, is the commercial center. *Goldfield* and *Tonopah* are mining centers.

New Mexico. Bound New Mexico. Trace the continental divide through it. What river system drains the west? What large river crosses from north to south? What rivers are east of the Rio Grande? Locate the capital; another city.

The chief industries of New Mexico are the herding of sheep and cattle, and copper and lead smelting. Coal, gold, and silver also are mined.

Many of the people are of Spanish descent and still speak the Spanish language. There are also many Indians, among them several tribes of pueblo Indians, each of which builds its village or "pueblo" as a single great building, made of sun-dried brick. The pueblos are often several stories high.

PUEBLO, NEW MEXICO.

Albuquerque, the largest city, is a railroad junction. *Santa Fe* was founded in 1582, but it was a thriving pueblo long before white men came to America.

Arizona. Bound Arizona. Name the principal streams. What part is lowland? Where is there a strip of lowland in the northern part? Locate the capital; another city.

The lowlands of Arizona are the driest and hottest part of the United States, though parts of the region produce excellent fruit and semitropical plants by the aid of irrigation. In the highland region copper mining is the most important industry; only two of the states produce more copper than Arizona.

Many of the people are of Spanish descent, and there are more Indians than in any other division of this section.

Tucson is a mining center and contains works for the reduction of gold, silver, and copper ores. *Phœnix*, the capital and commercial center, is in a well-irrigated region.

INDIANS OF ARIZONA.

Supplemental Work. Read chapters 24 and 31 of McMaster's "School History of the United States"; chapters 31–34, 38, 39, "Carpenter's Geographical Reader, North America"; "Through the Grand Canyon," in McGuffey's "Alternate Sixth Reader." Describe one city or scene in the Plateau states.

Longitude 125 West from 120 Greenwich 115

PACIFIC SECTION

Scale 133 miles to one inch, same as the maps of Northern Section, Southern Section, Plateau Section, British Isles, Central Europe, and Southwestern Europe

SCALE OF MILES
0 50 100 150 200 250

The highlands above 2000 feet are shown in the buff tints, the lowlands above sea level in the green tints, and the lowlands below sea level in the purple tint. The submerged part of the continental plateau is shown in the light blue tint.

SAN FRANCISCO AND VICINITY

Scale, 10 miles to one inch

CONTINUATION OF THE ALEUTIAN ISLANDS

ALASKA

Scale 330 miles to one inch, same as the map of the United States

SCALE OF MILES
0 100 200 300 400 500

E. M. FARQUHARIDEL.

BRADLEY & POATES, ENGR'S, N.Y.

THE PACIFIC SECTION

What three states compose this section? What great mountain ranges traverse its central part? What part of the region receives ample rainfall? (p. 48.) What parts are dry?

The eastern part of the Pacific Section is on the high plateau bordered by the Sierra Nevada and the Cascade Mountains. These ranges are about as high as the Rocky Mountains, but they seem much higher and grander when viewed from the west, because on that side they rise from broad lowland valleys. Between these valleys and the Pacific are the low Coast Ranges.

Among the deep gorges and canyons in the western slope of the Sierra Nevada, the Yosemite valley is especially noted for its magnificent scenery. The Cascade Mountains are noted for their high volcanic cones. The higher peaks of both ranges reach the limit of perpetual snow, and their upper valleys contain small glaciers.

West of the Sierra Nevada and Cascade ranges there is not a great difference between summer and winter temperatures. The rainfall occurs in the winter months. In the north it is heavy, but in the south there is so little rainfall that irrigation is necessary for crops in many localities. Along much of the coast chilly and foggy weather is common, but south of Point Conception the weather is delightful throughout the year.

East of the Sierra Nevada and Cascade ranges the summers are hot and the winters cold. In the Columbia valley there is enough rainfall for farming, but southward there is hardly any rainfall.

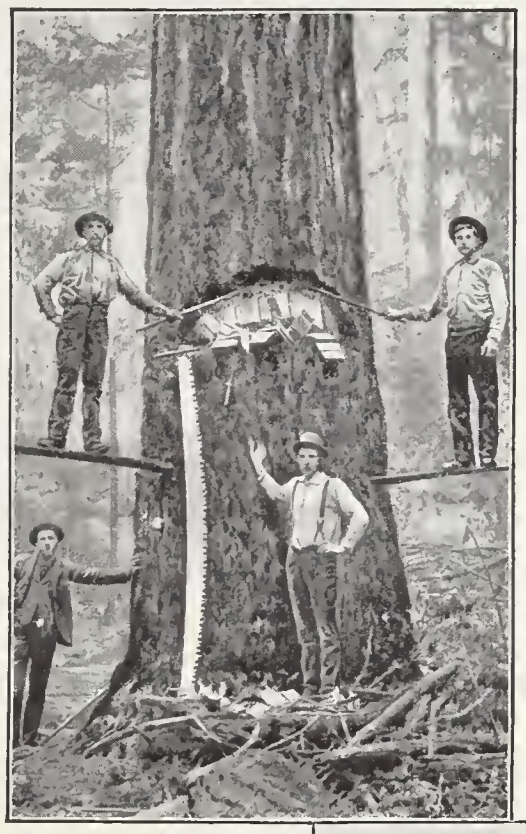
Agriculture is the principal industry in the valleys west of the great mountain ranges. Wheat is grown on the bottom lands, and grapes and other fruits on the foothills. Much wheat is also raised east of the Cascade Mountains in the Columbia valley. Great quantities of barley and hops are also grown in this section. In the drier regions, and on the mountain slopes, cattle and sheep raising is an important occupation. The wool clip of this section is very large.

The forests (map, p. 52) are the heaviest in the United States. Those in the central part of the section are composed chiefly of great redwoods, while farther to the north the Douglas fir or "Oregon pine" is the most valuable tree. In these regions lumbering is a great industry.

Gold mining is extensively carried on in the west slope of the Sierra Nevada, which is one of the richest gold fields in the world. Some of the gold is obtained in fine grains among the other rock waste deposited by mountain streams in their flood plains, but most of the gold is mined directly from veins in solid rock. Much quicksilver is mined in the central part of this section, and considerable coal in the north. The oil fields in southern California produce vast quantities of petroleum, which is much used for fuel.

Although the population, especially in the great valleys, is greater than on the Rocky Mountain highland, the section is still thinly settled. The whole section does not contain so many people as the city of New York. About one fifth the people are foreigners, mostly British, German, Italian, and Chinese.

LUMBERING, WASHINGTON.



The section is traversed by railroads from north to south along the line of the Sound, Willamette, and California valleys (map, p. 53). The most important railroads which enter the section, however, are the great transcontinental lines which cross the Rocky Mountain highland from the Mississippi valley.

The coast is closely bordered by the Coast Ranges, and has few bays and harbors. The ranges are broken in the north, however, by Puget Sound and the Columbia River, and in the central part by the Bay of San Francisco. These indentations afford safe harborage to the largest vessels, to them the railroads converge, and from them the foreign commerce of our Pacific coast is carried on.

WHEAT READY FOR SHIPMENT, WASHINGTON.

Washington. Bound Washington. What parts of the state lie in the Columbia valley? What sound is in the northwestern part of the state? By what strait is it joined to the Pacific? What part of the state is mountainous? Locate the capital; two other cities in the west; two in the east.

West of the Cascade Mountains the state is well covered with forests, which are its chief wealth. The largest lumber mills in the world are along Puget Sound. The fertile farming lands in the Sound valley and east of the mountains yield large crops of wheat, hops, and fruit. Coal is mined in the north more extensively than elsewhere in the section. The salmon fisheries of the Columbia River and Puget Sound add much to the wealth of the state.

Seattle, the commercial center, is in the coal and lumber region. It has an extensive commerce with Asian ports and is the terminus of two transcontinental railroads. *Tacoma* has a fine harbor. *Spokane* has excellent water power. *Wallawalla* is in a rich grain and fruit region.

SALMON FISHING, OREGON.

PICKING HOPS, OREGON.

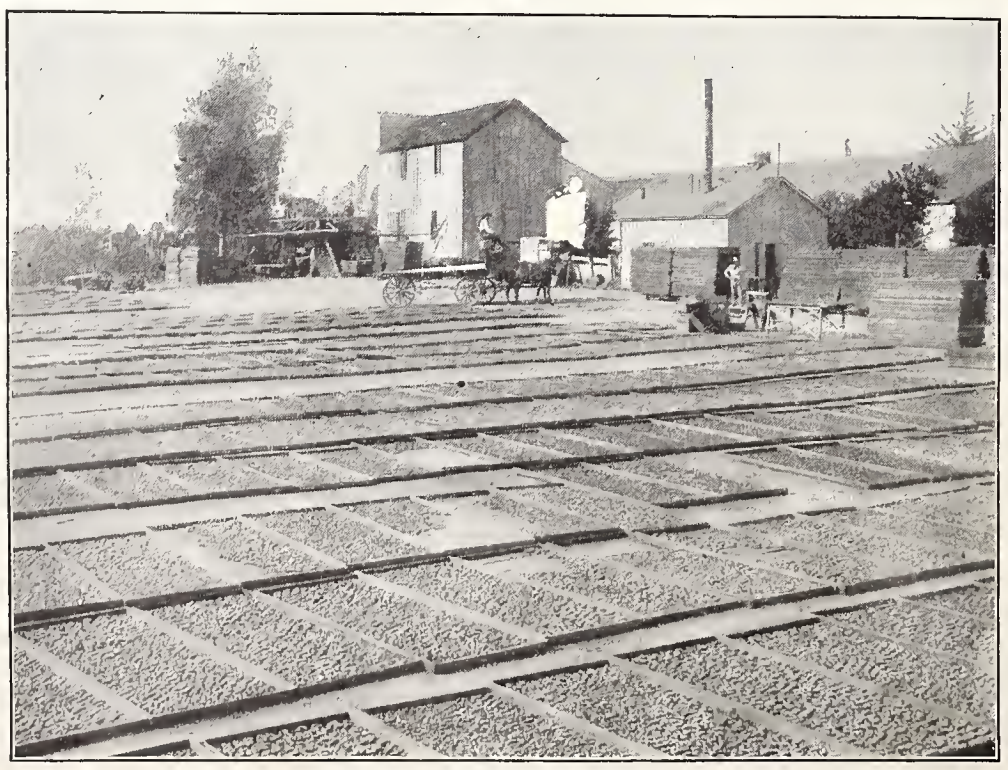
Oregon. By what is Oregon bordered? Name its three mountain ranges. How does eastern Oregon compare with eastern Washington in elevation and slope? What part of the state is dry? How does the map indicate this? Name the capital; one other city on the Willamette; one at the mouth of the Columbia.

Magnificent forests of Douglas fir cover much of the western half of the state, and lumbering is an important industry. In the fertile Willamette valley great quantities of hay, wheat, oats, hops, and fruit are raised, and much fine wheat for export is grown by the aid of irrigation in northeast Oregon. The wool clip is large, and many cattle are raised. Gold mining is carried on chiefly in the mountains of the southwest and the northeast. The Columbia River salmon fisheries of Oregon are among the most valuable in the world.

Portland is one of the largest cities in the Northwest. The building of jetties at the mouth of the Columbia has made it possible for large steamships to ascend to the city, and its foreign commerce is extensive. *Astoria* is the center of the salmon-fishing and -canning industry, and ships much lumber.

California. Bound California. What mountain ranges are in the state? What two rivers drain the California valley? Into what do they flow? Locate the capital; the chief city; three other cities in the central part of the state; two in the south.

California is nearly three times as large as any state of the Union east of the Mississippi River, and is exceeded in size by Texas only. It is the first state in the Union in the production of fruit, especially grapes, plums, apricots, oranges, and lemons; and stands high in the production of hay, wheat, barley, sugar beets, hops, and live stock.



DRYING FRUIT, CALIFORNIA.

California supplies about one fourth of the gold and petroleum produced in the United States, and a large part of the world's yield of quicksilver.

Valuable lumber is obtained from the redwood forests in the northwestern part of the state. On the west slopes of the Sierra Nevada are several small groves of a kind of redwood, which contain some of the most gigantic trees in the world.

Among the chief manufacturing industries are sugar refining, fruit preserving, flour and lumber milling, shipbuilding, and wine making.

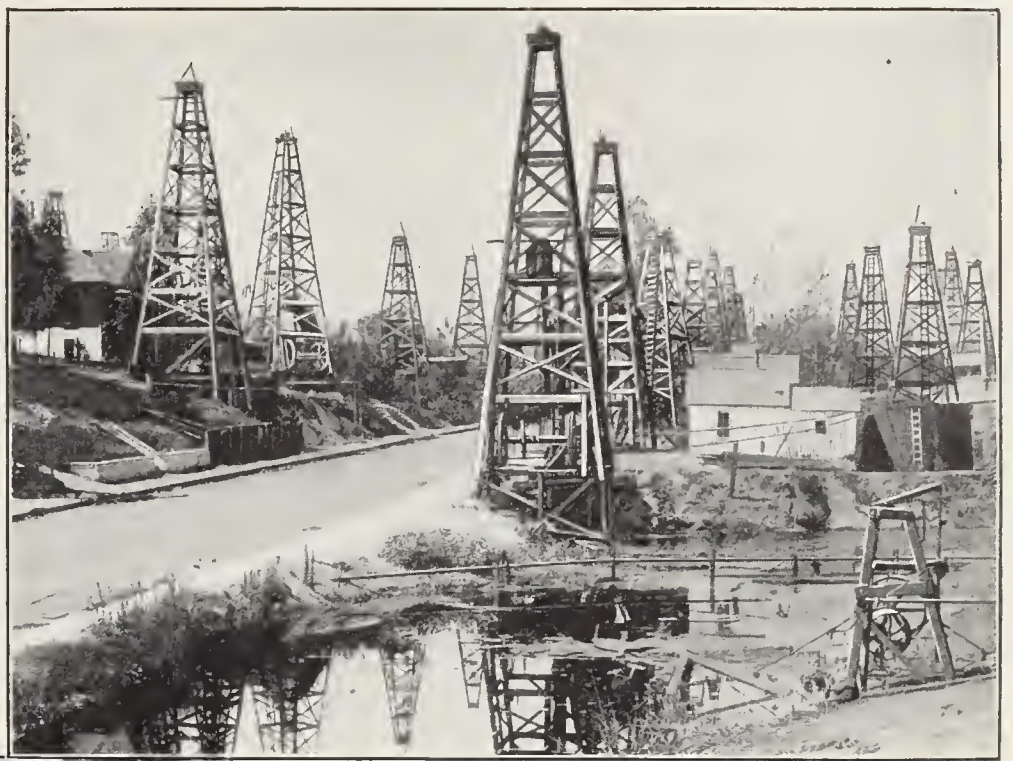
San Francisco, the largest city on the Pacific slope, lies on the peninsula between San Francisco Bay and the Pacific Ocean. It owes its growth chiefly to the fine harbor afforded by the nearly land-locked bay. The narrow entrance to the bay is called the Golden Gate.

The city was founded by Spanish monks from Mexico as the mission of San Francisco, and continued a small settlement until the discovery of gold brought thousands of people to California. The place immediately became the most important commercial center of the Pacific coast.

An extensive ocean commerce is carried on with Japan, China, Australia, and the Pacific Islands, and also with Europe and the east coast of the United States. The heaviest commerce, however, is overland by the transcontinental railroads. A large part of the manufacturing of the state is cen-

tered in this city, the chief industries being sugar refining, meat packing, and the manufacture of machinery, clothing, and flour.

Los Angeles, the commercial center of southern California, is in the orange-growing region. *Oakland*, on the opposite side of the bay from San Francisco, is a great suburb and railroad terminus of that city. *Sacramento*, the capital, is in a fertile agricultural region. The city is protected from floods by levees. *San Jose* and *Stockton* are important trade centers. *San Diego* has a good harbor. *Alameda* and *Berkeley* are important suburbs of San Francisco, and at Berkeley is located the great University of California.



Petroleum Wells, Los Angeles, Cal.

Canning Fruit, California.

Alaska. Where is Alaska? What country is east of it? What waters are north, west, and south? By what is it separated from Asia? What part is most mountainous? What great river traverses the country? To what nation does Alaska belong?

Alaska lies at the northwestern extremity of North America, in the same latitude as southern Greenland. It is more than twice as large as Texas, but is very thinly settled. About half of the inhabitants are whites, and the rest are chiefly Indians and Eskimos.

The southern coast is very rough and mountainous. Some of the peaks are over three miles high, and one of them is the highest in North America. These mountains prevent the warm, moist winds of the Pacific from reaching the interior, which is therefore very cold during most of the year. Part of the interior is covered with open forests, but much of it is a bleak tundra (§ 101, p. 24). The southern slopes of the mountains are much warmer, receive abundant rains, and are covered with forests. The summits of the mountains are always snow-clad. Great glaciers creep down most of the larger valleys, many of them extending to the sea, where parts of them break off and float away as icebergs (see p. 16).

Gold Mining, near Cape Nome, Alaska.

Most of the people live near the southern and western coasts. The chief occupations are hunting fur-bearing animals, fishing for cod and salmon, and gold mining. Some hardy vegetables grow in the south, but the climate is too damp for grain.

Most of our sealskin garments are made from the skins of fur seals killed on or near the Pribilof Islands, which lie in Bering Sea and belong to Alaska. The sea otter, the marten or sable, the black bear, and the silver fox are also killed in Alaska for their valuable fur.

Gold is found in many places in Alaska. There are rich fields near Cape Nome and on the Koyukuk River. The Klondike gold field is in Canada, just across the Alaskan boundary, but is reached from the south coast of Alaska. Mining in Alaska is very costly and dangerous because of the long, cold winters and the scarcity of food.

Alaska belongs to the United States. It is ruled by a governor and other officers appointed by the Federal government at Washington. The chief settlements are *Nome* and *Juneau*, mining towns. *Skagway* is the port for trade with the mining settlements of the upper Yukon valley, which is reached by a railroad over White Pass. *Sitka*, a trade center of southern Alaska, is beautifully situated on Baranof Island.

Hawaii, Samoa, p. 149. **Porto Rico,** p. 94. **Philippines,** p. 138.

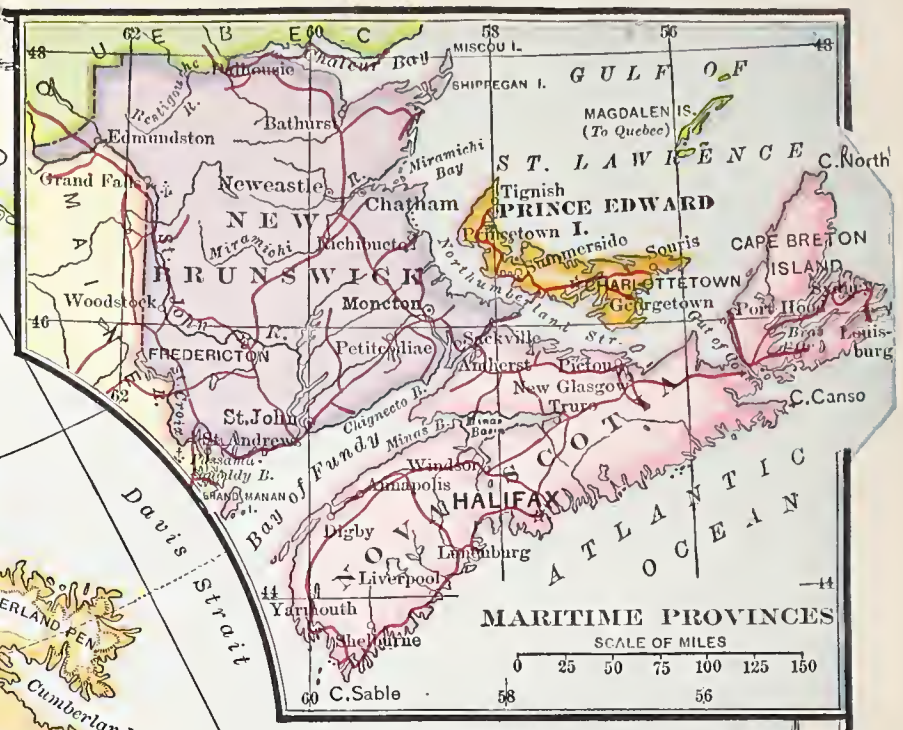
Supplemental Work. Read chapters 35–37, 40, "Carpenter's Geographical Reader, North America." Describe one city in this section as fully as San Francisco is described.

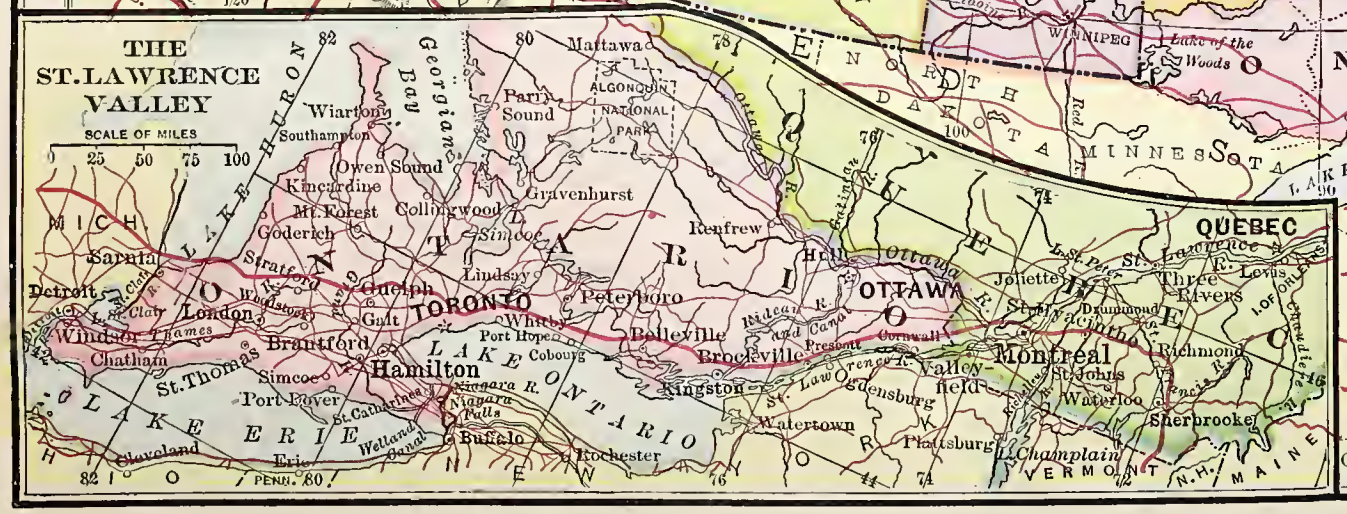
VIII 07.

DOMINION OF CANADA AND NEWFOUNDLAND

Scale 330 miles to one inch, same as the maps of the United States, Mexico and Europe.

SCALE OF MILES
0 100 200 300 400 500





L.L.POATES, ENGR., N.Y.

COUNTRIES NORTH OF THE UNITED STATES

THE DOMINION OF CANADA

What country borders the United States on the north? What circle crosses the northern part of Canada? In what zones is Canada? Compare it with the main body of the United States in size (map, p. 40).

What great bay is in Canada? Compare it with the Gulf of Mexico in size. What archipelago is north of Canada? What strait separates the eastern part of this archipelago from the mainland? What two peninsulas are on the north coast of Canada? What gulf is east of Canada? Name the four largest islands bordered by this gulf. What peninsula is south of this gulf? What large islands are off the west coast of Canada?

From the map on p. 36 locate the highlands of Canada. Compare the widths of the western highland in Canada and in the United States. Name the principal mountain ranges. What plateau is in the east? What part of Canada is lowland? Trace the divide of the Hudson Bay slope (p. 86 and p. 36). Name the principal river basins of that slope; of the Arctic slope; of the Gulf of St. Lawrence slope. Name the chief basins of the Pacific slope. In which of the basins of Canada are there large lakes? In which are the largest lakes?

From the maps on p. 38 describe the climate and rainfall of eastern, central, and western Canada.

The Dominion of Canada occupies most of the northern part of North America, including the Arctic Archipelago, and is larger than the United States and Alaska combined. Like the United States, it has an extensive highland in the west, a smaller and less lofty highland in the east, and between them a broad central lowland. Most of the Canadian lowland slopes to Hudson Bay, as most of the lowland in the United States slopes to the Gulf of Mexico, while a part of the lowland in both countries slopes to the Gulf of St. Lawrence.

Canada being so far north, the moisture in the winds from the Pacific often falls as snow on the western highlands, and the higher mountain ranges abound in glaciers.

Canadian Rocky Mountains.

Their lower slopes are covered with heavy evergreen forests, and the region is noted for its scenery. Nearly all the large rivers which rise in this region flow from the melting ends of glaciers. The Laurentian plateau is lower and smoother than the western highlands, but it is too cold and bleak for cultivation.

The northern coast of Canada is so cold that neither trees nor food plants can grow there. Farther south a broad forest belt stretches entirely across the continent. In the southern part of this belt are valuable forests of pine and other building timber. Southern Canada, though the winters are long and cold, is well adapted to wheat and the hardier plants of the temperate zone. The basin of Lake Winnipeg is the chief wheat-growing region, and the peninsula between Lake Huron and Lake Erie is a fruit and dairy region.

In the cold, uninhabited regions of the north, caribou and fur-bearing animals are abundant. The fisheries off both coasts of Canada are among the most extensive in

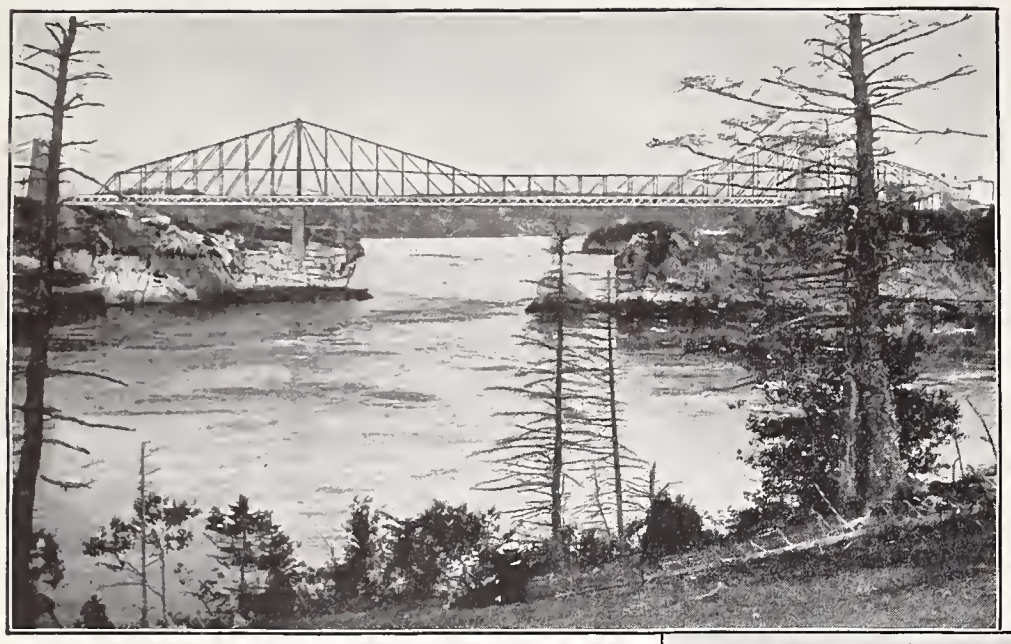
Logs and Sawmill, Vancouver.

the world. Cod, herring, mackerel, and lobsters are the chief catch in the eastern coast waters, and salmon in the western.

The mineral product is important. Gold, silver, and copper are mined chiefly in the western part, and coal in both the east and the west. Nickel, petroleum, iron ore, asbestos, and lead are also found.

Although Canada is larger than the United States, the population is less than that of New York state, and is confined chiefly to the southern part.

The first white settlers were Frenchmen in the St. Lawrence basin. British settlers and their descendants form the greater part of the population, and their energy has made of Canada the most prosperous part of the Western Continent, after the United States. Many descendants of the French settlers still live in the lower St. Lawrence valley. They are mainly Catholics, while the



ST. JOHN RIVER, AT ST. JOHN, NEW BRUNSWICK.

PARLIAMENT BUILDING, OTTAWA.

greater part of the English are Protestants. Farther west there are many "half-breeds" of mixed French and Indian descent.

In northern Canada are a few thousand Eskimos and Indians. In winter the Eskimos live along the coast, but in summer they migrate inland, where caribou are abundant. The Indians are hunters and trappers. The valuable furs which they procure are sold to the Hudson Bay Company, which has established trading posts throughout this region.

A TRADING POST OF THE HUDSON BAY COMPANY.

Canada belongs to Great Britain, but has a form of government something like that of the United States. There are nine *provinces*, similar to our states, each with its local government. The people of each province elect representatives to a *Parliament*, like our Congress, which makes laws for the whole Dominion. But instead of an elected president, as in our country, Canada has a governor general appointed by the king of Great Britain. The provinces are all in the southern part of Canada. Most of the northern part of the country is still a wilderness without local government.

Prince Edward Island, in the Gulf of St. Lawrence, is the smallest province. What city is its capital?

The province of **Nova Scotia** includes the peninsula on the mainland, and the island of Cape Breton. The fisheries are very valuable, and from this province comes most of the coal mined in eastern Canada. *Halifax*, the capital, is the chief British naval station in North America.

QUEBEC.

From **New Brunswick** lumber and cured fish are exported. *Fredericton* is the capital, and *St. John* the largest city and chief port.

Quebec is one of the oldest and most populous provinces. A large part of the population is of French descent. The city of *Quebec* is one of the oldest in North America. The upper city, on a high cliff overlooking the St. Lawrence River, is surrounded by fortifications; the business part of the city lies along the river bank. *Montreal*, the metropolis of eastern Canada, lies at the mouth of the Ottawa River and at the head of navigation for ocean steamers on the St. Lawrence. Except when the river is blocked with ice both of these cities are great shipping points for lumber, wheat, and dairy products.

Ontario borders the Great Lakes and is the most prosperous and wealthy province. *Toronto*, an important commercial center, is the capital. *Ottawa*, the capital of the whole Dominion, is a great lumber center.

Both Ontario and Quebec contain vast forests of valuable timber, and lumbering is perhaps the chief industry. Farming is also very important. Large crops of oats, wheat, potatoes, and apples are raised, and much cheese and butter are produced for export.

Manitoba lies in the basin of Lake Winnipeg in Canada's great wheat region. This region is mostly open prairie, and it extends westward up the broad valleys of Assiniboine and Saskatchewan rivers, through the new provinces of Sas-

WHARVES AT MONTREAL.

katchewan and **Alberta**. The cheap and fertile land of this whole region is being very rapidly taken up by immigrants from all parts of Europe and from the United States. *Winnipeg*, the capital of Manitoba, is the largest Canadian city west of Toronto, and is growing rapidly. *Regina*, the capital of Saskatchewan, is a stock-raising center. *Calgary* and *Edmonton*, in Alberta, are stock-raising and coal-mining centers.

British Columbia, which borders on the Pacific, is the largest province. Gold and coal mining, lumbering, and fishing are the chief employments. *Victoria*, on Vancouver Island, is the capital. *Vancouver*, the terminus of a Canadian transcontinental railway, is the commercial center and chief seaport.

Northern Canada. The chief wealth of northern Canada is derived from the fur trade. The district of Yukon, however, is more important for the rich gold mines around Dawson in the Klondike region.

Most of the export trade of Canada is with Great Britain. The imports are largely from the United States. From Montreal, St. John, and Halifax steamship lines run to European ports, and from Vancouver there are steamship lines to Japan and Australia. From Montreal to Vancouver the Canadian government has constructed a great transcontinental railroad, which is connected by branches with the railroad system of the United States. By this road considerable traffic between Europe and Asia crosses Canada.

CANADIAN DOG TEAM.

Newfoundland. The island of Newfoundland, together with the Labrador coast, forms a British colony by itself, and is not a part of Canada. The interior of the island is a wilderness. The chief occupation is fishing, and many of the islanders live along the coast of the mainland during the fishing season. *St. Johns* is the capital.

When the French gave up Canada and Newfoundland to Great Britain, they retained the two small islands of **St. Pierre** and **Miquelon**, south of Newfoundland, which they use as fishing stations.

Supplemental Work. Read chapters 41 and 42 of "Carpenter's Geographical Reader, North America."

DANISH AMERICA

What two islands rise from the continental plateau between Europe and America? (map, p. 8 and p. 36.) Are these islands nearer to America or to Europe? Which of them is the larger?

Greenland. Nearly the whole of Greenland is covered hundreds of feet deep by a continental glacier (§ 58). It is only near the coast that the surface of the land is

HARBOR AT VANCOUVER.

not covered with ice. The jagged coast line of southern Greenland indicates a sinking coast (§ 28). Perhaps it is the great weight of the ice sheet that causes the sinking. In places the ice sheet extends into the sea, forming long ice cliffs. Icebergs broken from these cliffs are carried southward by ocean currents and at certain seasons make the navigation of the Atlantic dangerous as far south as Newfoundland.

In the coast region of the south mosses and lichens grow, with patches of grass and a few flowering plants. There are also a few stunted trees, but they rarely grow higher than a man's head. The principal wild animals of the land are the musk ox, the reindeer, the arctic fox, and the polar bear. The coast waters are frequented by seals,

GOVERNMENT BUILDING, VICTORIA.

THE GREATER ANTILLES

Scale 133 miles to one inch, same as map of Northern Section of the United States

SCALE OF MILES

0 50 100 150 200 250 300

MEXICO CENTRAL AMERICA AND THE WEST INDIES

Scale 330 miles to the inch, same as the maps of the United States. Canada, and Europe

SCALE OF MILES

0 100 200 300 400 500 600

ISTHMUS OF PANAMA

SCALE OF MILES

0 5 10 15

Longitude West from Greenwich

E.Y. FARQUHAR, DEL.

L. L. POATES ENGR'G CO., N.Y.

walruses, whales, and fish. Millions of eider ducks and other aquatic birds nest along the coast.

But few people live in Greenland, and most of them are Eskimos. The Eskimos live in low, filthy hovels made of loose stones, or sometimes of blocks of snow and ice. They fish and hunt for sea animals, using the flesh for food, the fur for clothing, and the fat for fuel. On the southwest coast there are a few small trading settlements of white men from Denmark.

Eskimos in Eskimo Boats.

Iceland is about as large as Kentucky. It is a rugged plateau containing many volcanoes, several of which are active and cause frequent earthquakes. Hot springs are numerous, and there are famous geysers. Parts of the island are covered with ice fields, and the deep fiords of the northern coast are often packed with ice brought in by the Arctic currents. The southern coast is much less broken and is kept free from ice by the warm currents from the south.

The climate, though raw and moist, is moderated in the south by winds from the ocean. Grass and vegetables grow well, though it is too cold for grain. There are many aquatic birds, and the coast waters abound in excellent fish.

Iceland was settled by people from Norway and Denmark long before Columbus discovered America, and their descendants still live there, chiefly in the southern part of the island. They are thrifty, intelligent, well-educated people, and are employed chiefly in raising sheep, cattle, and horses, and in fishing.

The people make their own laws; but the governor is appointed by the king of Denmark.

Supplemental Work. Read chapter 61, "Carpenter's Geographical Reader, Australia," etc.; "My Arctic Journal," by Josephine D. Peary; or "Farthest North," by Fridtjof Nansen.

COUNTRIES SOUTH OF THE UNITED STATES

MEXICO

What country borders the United States on the south? In what zones is Mexico? What waters border it? What peninsulas does it contain? From the map on p. 36 locate the lowlands of Mexico. What part of the country is highland? Name and locate the chief mountain range. Are there many large rivers in Mexico? Name one that drains a small part of the country in the northwest.

Mexico occupies the part of North America south of the United States between the Gulf of Mexico and the Pacific.

There is a strip of lowland along either coast, but most of Mexico lies on the Rocky Mountain plateau. The plateau is bordered by mountain ranges corresponding to the Rocky and the Cascade Mountains, but the western range is much higher and more continuous than the eastern. In the north the plateau is about three fourths of a mile high, but it rises gradually toward the south. In this region are many volcanoes, some active and some extinct. The volcano Orizaba is about three and one half miles high. Earthquakes are not uncommon throughout Mexico.

Mount Orizaba, the Highest Peak of Mexico.

Owing to the tropical position of Mexico there is little difference between the temperatures of summer and of winter; but there is a great difference in temperature of regions at different elevations. The lowlands are always hot; the plateau is always temperate; and the higher mountain peaks are always snow-clad. The seasons of Mexico are the wet and the dry. Nearly all the rain falls during the summer months. The northern part has very little rain at any time (§ 93).

Plants and animals of both the North and the South American regions are found in Mexico. In the lowlands mahogany, rosewood, logwood, and vanilla grow in the dense forests, and rice, sugar cane, tobacco, cotton, and fruits are cultivated, as well as the cassava, from the root of which the natives make farina meal for their bread; and Sisal hemp, or henequen, of which cordage and hammocks are made. On the lower mountain slopes coffee is cultivated,

MAGUEY FIELD, MEXICO.

COPPER SMELTER, MEXICO.

and higher up are open forests of oak, pine, and other trees of the temperate zones. On the plateau grain and beans are the chief crops. Mexico exports Sisal hemp, coffee, and cabinet and dye woods.

A characteristic Mexican plant is the maguey, or "century plant," from which is made a kind of fermented drink called *pulque*. It is a species of this plant that yields the Sisal hemp.

In the drier portions of the plateau the raising of cattle, horses, and sheep is an important industry, and cattle and hides are exported.

The mines of Mexico are its chief source of wealth. Mexico is one of the great silver-producing countries of the world, and this metal and its ore form the chief exports. Copper, gold, and lead are also exported, as well as the beautiful stone called "Mexican onyx," much used for interior decoration.

The government of Mexico is modeled after that of the United States. The republic consists of twenty-seven states, two territories, and a federal district, like the District of Columbia. About one fifth of the people are white, mostly descendants of Spanish settlers; nearly one half are of mixed Spanish and Indian blood; and the rest are pure Indians. Most of the land is owned by the white people. Many of the Indians are laborers in the mines, or on the stock "ranches," or farms. Nearly all Mexicans are Catholics.

GRADING COFFEE, MEXICO.

Long before America was colonized by white men, the Indians of central Mexico, called Aztecs, had advanced nearly to the stage of civilization. They had formed a confederacy, and lived in pueblos built of stone; they cultivated corn by the aid of irrigation, wore ornaments of gold, and knew something of working other metals.

The manufactures of Mexico are mainly liquors, cotton cloth, tobacco, paper, and earthenware for home use.

The foreign commerce is carried on chiefly with the United States, both by sea and by the railroads which

STREET MARKET, CITY OF MEXICO.

connect the plateau region with the railroad system of the United States. An important railroad extends from the Atlantic to the Pacific coast, across the Isthmus of Tehuantepec, the narrowest part of Mexico.

Mexico, the capital and largest city of the republic, is located in the federal district. It is on the plateau in a great basin which contains several large lakes. The sewage of the city and the high-water overflow of the lakes are conveyed out of the basin by a drainage canal forty miles long, which for six miles of its length occupies a tunnel through the mountains. Railroads connect

BANANA PLANTS, CENTRAL AMERICA.

the city with the railroad system of the United States. Most of the buildings are low, and many of the dwellings are built around courtyards ornamented with flower gardens and paved with stone.

Guadalajara and *Puebla* are large and important railroad cities on the plateau. At Puebla are produced the most important manufactures of Mexico, among them the famous Mexican blankets. *Vera Cruz* is the chief Atlantic seaport. It is connected by railroad with the city of Mexico. The harbor is so shallow, however, that ships unload into small boats. *Guaymas* and *Acapulco* are important ports on the Pacific coast.

CENTRAL AMERICA

By what waters is Central America bordered? Which coast has the greater width of lowland? (map, p. 36.) In what direction does most of the country slope? Name the chief lake of Central America.

Central America occupies the narrow part of the continent southeast of Mexico.

The plateau here is neither so broad nor so high as in Mexico. The mountains near the Pacific coast contain active volcanoes, and severe earthquakes are frequent. The climate is similar to that of southern Mexico, but warmer and with a heavier rainfall on the north coast.

Central America is more uniformly forest-covered than Mexico, but there are large tracts of grass land in the interior. Coffee, bananas, sugar, cacao beans, rubber, hides, gold, and cabinet and dye woods are exported.

Belize, a strip along the west coast of the Gulf of Honduras, was settled by English logwood cutters, and is still a British colony. The rest of Central America was settled by Spaniards. It consists of six small independent republics. Name them.

There are only a few thousand people of pure Spanish descent in the Central American states. Most of these are merchants and planters, and the foreign trade is in their hands. The people of mixed Spanish and Indian blood are more numerous than the whites, but more than half the entire population are pure-blooded Indians. Some of these are becoming civilized.

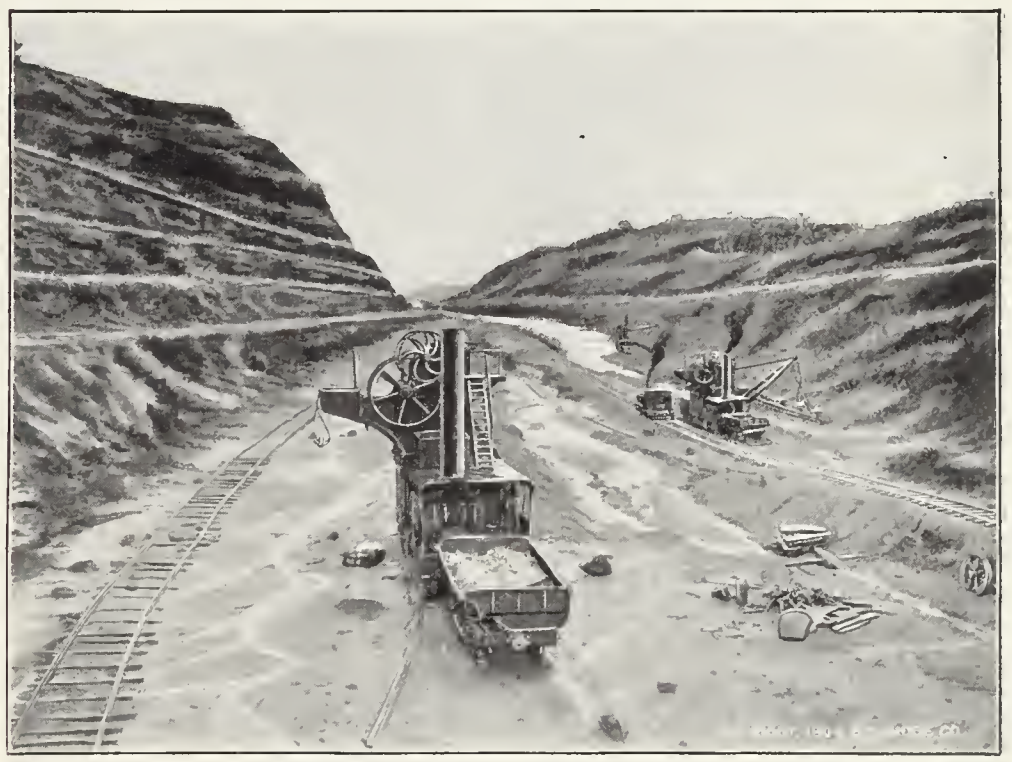
Guatemala and **Salvador** contain half the people in Central America. Name the capital of each.

What is the capital of **Honduras?** Honduras mahogany is specially noted.

What is the capital of **Nicaragua?**

The name **Costa Rica** means "rich coast." Coffee has been cultivated in this state for a hundred years, and bananas are exported to the United States. What is the capital?

Across the republic of **Panama** the United States controls a belt or zone ten miles wide, in which a ship canal is under construction from the Caribbean Sea to the Pacific Ocean. The completed canal will make a short water route between the east and west coasts of America. The cities of *Panama* and *Colon* (which are not included in the zone) are at the ends of the canal. They are at present connected by a railway over which is transported much foreign commerce.



WORK ON THE PANAMA CANAL.

THE WEST INDIES

What parallel of latitude crosses the central part of the West Indies? Between what bodies of water does this chain of islands lie? What strait and channel separate the chain from the mainland of North America? Measure the length of the chain, using the scale of miles. On the map of the United States (p. 50) measure the same distance west from New York city. Name the four largest islands of the chain.

The West Indies form an island chain about two thousand miles long north and east of the Caribbean Sea. The islands comprise three groups: the Greater Antilles, including the four largest islands of the chain; the Bahama group; and the Lesser Antilles.

The islands are partly volcanic and partly of coral formation; many of them are surrounded by coral reefs and some are subject to earthquakes. Most of the Lesser Antilles are high, and consist of volcanic rock. The islands of the Greater Antilles have broad lowland coast regions; much of Cuba is lowland. The Bahamas are

Drying Sponges, Bahamas.

low islands of coral limestone and broken shell. The area of all the islands together is about twice that of Pennsylvania, nearly half of this being in the island of Cuba.

The climate is tropical, but the heat is tempered by the trade winds. The rainy season occurs during our summer, and the dry season during our winter. Terrible hurricanes are not uncommon. Most of the islands have luxuriant tropical forests. The most valuable products are sugar cane, tobacco, coffee, and tropical fruits, "Spanish" mahogany and other cabinet and dye woods, rum made from sugar, cacao beans, sponges from the Bahamas, allspice and ginger from Jamaica, and asphalt from Trinidad.

Asphalt Lake, Trinidad.

The population is rather dense and is largely of Spanish or negro descent, for the Spaniards discovered and settled the islands and introduced many negroes from Africa to work the plantations.

Cuba is a republic under the influence of the United States. The soil is remarkably fertile and almost inexhaustible. Forests cover half the island and yield mahogany, lignum vitæ, ebony, logwood, and cedar. About one fifth of the world's cane-sugar crop, and much of the best tobacco for cigars, comes from Cuba. There are valuable iron and copper mines. The island is traversed by railroads.

Havana, the capital, is a large and important commercial city and the chief port. The choicest cigars are made here. *Santiago de Cuba*, near the iron and copper mines, is the largest seaport in the southeast.

Porto Rico belongs to the United States. It is the smallest of the Greater Antilles, but is about two thirds

Sugar Mill, Cuba.

as large as Connecticut. It has even more people than that state and is therefore quite densely populated. About a third of the people are negroes; the rest are whites of Spanish descent.

The island is traversed from east to west by a range of low mountains, from which the forests have been largely cleared to make room for extensive coffee plantations. Sugar cane, tobacco, and rice are produced at lower elevations, and many cattle are raised.

San Juan, the capital, on the north coast, and *Ponce*, on the south coast, are the principal cities and ports.

The island of **Haiti** includes nearly one third of the area of the West Indies and consists of two independent negro republics. Name them. Years ago Haiti was a French colony, and a form of the French language is used by the negro inhabitants. Santo Domingo, how-

Cutting Sugar Cane, Porto Rico.

ever, was a Spanish colony, and the Spanish language still prevails in that part of the island.

Nearly one sixth of the area of the West Indies belongs to Great Britain. **Jamaica**, **Trinidad**, and the little island of **Barbados** are by far the most important of the British West Indies. Barbados is the most densely settled island of the whole chain, and exports much sugar.

Guadeloupe and **Martinique** are French possessions, and, after Trinidad, are the largest islands of the Lesser Antilles.

Several small islands of the Lesser Antilles belong to the European kingdoms of Denmark and the Netherlands, and several near the northern coast of South America are part of the republic of Venezuela.

Supplemental Work. Read chapters 43–45, "Carpenter's Geographical Reader, North America," and chapters 51–60, "Australia and Islands of the Sea"; "The Boy Travellers in Mexico," by Thomas W. Knox; "At last: a Christmas in the West Indies," by C. Kingsley.

CACAO HARVEST, JAMAICA.

CORRELATIONS AND COMPARISONS

Size. Through how many degrees of latitude does North America extend? Through how many degrees of longitude? When it is midnight in the Pribilof Islands, what time is it in Newfoundland?

Coast. Name the chief seas and bays of the grand division; the chief peninsulas; the chief islands. Compare Greenland and Cuba in size; in surface; in climate. Compare Florida and Lower California in position; in climate; in formation. Compare Hudson Bay and the Gulf of Mexico. Compare the Chesapeake and San Francisco bays.

Surface. Name the chief mountain ranges of eastern and western North America, giving the direction, the general height, the formation, and the comparative age of each system. Name some mountains with jagged tops; some with smooth and level tops. Name and describe the chief plateaus of North America. Name and describe the lowlands.

Drainage. Name the chief lakes of North America. How are lakes formed? Where are streams generally rapid? Why? Where are streams sluggish? Why? Name some rivers which have built deltas; some which flow into estuaries; some which have cut canyons; some which meander through flood plains; some which are obstructed by falls. Explain the formation of deltas; estuaries; canyons; flood plains; falls. Name some rivers useful to commerce; some not useful.

Soil. Name the unproductive regions of North America. Which are so because the soil is too cold? too dry? too swampy? Where have glaciers made the soil more fertile? less fertile? How? Where are there alluvial plains? sandy plains? old lake beds?

Rock Formations. Explain the formation of the Tidewater region of eastern North America; of the Piedmont region. In what region are there mountain folds? In what region are there tilted strata? In what western region are there great outflows of lava? Where are there volcanoes in North America? Describe volcano formation. Where are there coal deposits? Describe the formation of coal; of peat.

Climate. Locate the heat belts of North America in summer; in winter. Describe five climatic belts or regions. Tell about the winds and rainfall of North America. Show by examples how climate may be affected by elevations of land; by latitude; by distribution of land and water; how climate may affect products and occupations. Describe the progress of a cyclone across North America; its path; its rotation, and the weather produced by its different parts. Where are there snow-capped mountains? mountain glaciers? continental glaciers?

Life. What are the three life regions of North America? Which is the largest? Give reasons for the existence of these regions. Where are there few large *wild* animals? Why? Give some uses to which the *native* plants and animals of North America are put.

People. In what parts of North America do people of the black race chiefly live? Tell what you know of their history. What peoples of the red race are found in North America? How do the Eskimos live? Where are they found? Where do the Indians chiefly live? Where were they most nearly civilized when America was discovered? What people of the white race chiefly inhabit North America? What nations early settled there? What parts of North America are most densely populated? least densely? Why? What forms of government do you know? Describe each. What parts of North America belong to European nations? Name the republics of North America. Tell what you know of the history of the North American nations. What religion prevails in North America? What are the other chief religions of the world? What are the two chief languages spoken in North America? In what parts is each spoken?

Industries. How does the United States rank in each of the seven great industries? What are the chief industries of British America? of Danish America? of Mexico and Central America? of the West Indies?

Locate the chief agricultural regions of North America. How does agriculture depend upon climate? What is irrigation? Where is it practiced? Tell where each of the following is grown, and why: wheat, corn, rice, hay, oranges, sugar cane, cacao, tobacco, cotton.

In what regions of North America are these animals raised: cattle; hogs; sheep; horses? Give the chief uses of each. Where are there fur-bearing animals? In what waters are obtained fish? sponges?

Tell where there are dense forests; open forests; oak, cottonwood, pine, cedar, cypress, mahogany, redwood.

What regions yield each of the following: anthracite coal, bituminous coal; petroleum, natural gas; iron, copper, gold, silver; marble? How are some of these formed? How obtained? How used?

Where are the great manufacturing regions? Where are these articles made: cotton goods, woolen goods, clothing, silk goods, shoes; lumber, rubber goods, pitch; steel ships, iron and steel, glass, pottery, kerosene; butter and cheese, packed meat, refined sugar, flour?

Tell the chief trade advantages of each country of North America. Make a list of the chief trade centers, and tell the advantages of each. Show that surface forms affect railroad routes. Point out some canals.

Make a list of the capital cities in North America. What is a capital? Make a list of large cities, and tell of each the reason for its position or importance.

AREA AND POPULATION OF THE EARTH.

SUMMARY.

Length of earth's axis (miles)		7,900
Length of equator	"	24,900
Earth's Surface (sq. mi.)		196,900,000
Pacific Ocean	(sq. miles)	71,000,000
Atlantic Ocean	" "	34,000,000
Indian Ocean	" "	28,000,000
Antarctic Ocean	" "	7,500,000
Arctic Ocean	" "	4,000,000
The Sea	" "	144,500,000

	Sq. Miles.	Population.
North America	9,431,000	106,095,000
South America	6,856,000	38,483,000
Europe	3,842,000	400,700,000
Asia	17,056,000	909,199,000
Africa	11,512,000	141,204,000
Australia, etc.	3,456,000	6,458,000
S. Polar Lands	254,000	.....
The Land	52,407,000	1,602,139,000

North America.

Greenland	837,837	12,000
Iceland	39,768	79,000
Nova Scotia	21,429	460,000
N. Brunswick	27,992	331,000
Prince Edw. I.	2,162	103,000
Quebec	344,633	1,649,000
Ontario	222,857	2,183,000
Manitoba	73,745	255,000
Brit. Columbia	372,625	179,000
Alberta	253,540	
Saskatchewan	250,650	212,000
Yukon, etc.	2,159,553	
Part Gt. Lakes	30,540	.....
Dom. of Canada	*3,759,726*	*5,372,000*
Newfoundland	42,730	217,000
East Labrador	6,950	4,000
Brit. America	*3,809,406*	*5,593,000*
St. Pierre, etc.	93	7,000
U.S. and Alaska	3,679,403	76,059,000
Mexico	767,258	13,606,000
Guatemala	43,641	1,842,000
Honduras	44,274	544,000
Salvador	8,170	1,007,000
Nicaragua	49,552	429,000
Costa Rica	18,689	335,000
Panama	33,302	(?) 228,000
Pan. Canal Zone	474	(?)
Belize	7,560	37,000
Central America	*205,662*	*4,422,000*
Cuba Group	44,015	1,573,000
Haiti, Rep. of	11,072	1,294,000
Santo Domingo	18,756	416,000
Jamaica	4,841	777,000
Porto Rico	3,435	953,000
Bahama Is.	4,404	54,000
Other Islands	4,937	1,232,000
West Indies	*91,460*	*6,299,000*
Bermuda Is.	19	18,000

South America.

Colombia	465,714	3,917,000
Venezuela	363,822	2,445,000
Guiana, British	95,174	296,000
" Dutch	49,846	87,000
" French	30,465	33,000
Brazil	3,300,816	14,334,000
Paraguay	97,726	636,000
Uruguay	68,996	978,000
Argentina	1,083,551	4,957,000
Chile	293,050	3,174,000
Bolivia	442,636	1,766,000
Peru	438,996	4,586,000
Ecuador	118,627	1,272,000
Falkland Is., etc.	6,573	2,000

Europe.

England	50,839	31,072,000
Wales	7,468	1,456,000
Scotland	30,405	4,472,000
Ireland	32,352	4,459,000
Man and Chan. Is.	303	150,000
Gr. Brit. & Ir.	*121,367*	*41,609,000*
German Empire	210,232	60,605,000
Luxemburg	999	247,000
Netherlands	12,562	5,104,000

Europe (*continued*).

	Sq. Miles.	Population.
Switzerland	15,964	3,325,000
Austria	115,924	26,151,000
Hungary	125,607	19,255,000
Bosnia, etc.	19,702	1,737,000
Liechtenstein	61	10,000
Aus.-Hungary	*261,294*	*47,153,000*
Norway	124,122	2,222,000
Sweden	172,920	5,136,000
Denmark	14,848	2,450,000
Faroe Islands	512	15,000
Belgium	11,369	6,694,000
France	207,217	38,962,000
Monaco	1	15,000
Andorra	175	6,000
Spain	191,986	18,235,000
Gibraltar	2	27,000
Portugal	34,507	5,022,000
Azores	922	257,000
Madeira Is.	315	151,000
Italy Proper	91,455	28,154,000
Sicily	9,937	3,530,000
Sardinia	9,295	792,000
Italy	*110,687*	*32,476,000*
San Marino	24	11,000
Malta	125	188,000
Greece	24,973	2,434,000
Turkey in Eur.	64,599	5,885,000
Bulgaria	37,320	3,744,000
Crete	3,328	310,000
Thasos (Egypt)	152	12,000
Montenegro	3,506	228,000
Servia	18,650	2,494,000
Roumania	50,717	5,957,000
Russia (includ. Pol. & Finland)	1,976,586	105,993,000
Caucasia (north of mountains)	86,660	3,733,000
Sea of Azof	14,519	.....
Nova Zembla	35,449	.....
Russia in Eur.	*2,113,214*	*109,726,000*
Spitzbergen, Franz Josef L'd, Jan Mayen, etc.	33,506	.....

Africa.

		Sq. Miles.	Population.
Morocco	Including parts of the Sahara	176,062	7,000,000
Algeria		343,629	4,802,000
Tunis		64,623	1,800,000
Tripoli		405,791	1,000,000
Egypt		247,876	9,717,000
Sahara, remaining part		2,461,156	791,000
Anglo-Egyptian Sudan		785,714	4,000,000
Abyssinia		311,880	8,330,000
Eritrea		42,471	331,000
Fr. Somali Coast		8,108	50,000
Brit. Somaliland		59,846	153,000
Brit. East Af.		433,214	4,908,000
It. Somaliland		146,718	400,000
Rio de Oro, etc.		82,124	315,000
Fr. West Africa		680,617	12,700,000
Gambia		3,707	90,000
Port. Guinea		13,089	170,000
Sierra Leone		26,911	1,100,000
Liberia		36,834	1,000,000
Gold Coast		78,533	1,700,000
Togoland		33,668	900,000
Nigeria		361,004	23,700,000
Kamerun		191,120	3,500,000
French Kongo		680,308	8,500,000
Kongo State		926,872	19,000,000
Angola, etc.		490,787	3,840,000
Port. E. Africa		295,779	2,300,000
Zanzibar		960	250,000
Ger. S.W. Africa		317,953	210,000
Ger. E. Africa		374,234	6,855,000
Rhodesia		408,494	1,350,000
Transvaal Col.		114,286	1,345,000
Orange R. Col.		48,340	387,000
Natal		34,710	1,109,000
Cape Colony		276,988	2,410,000
Other Br. S. Af.		313,926	1,394,000
Madagascar		228,610	2,619,000
Is. of Indian O.		3,876	666,000
Canary Islands		2,944	359,000
Cape Verde Is.		1,476	147,000
S. Atlantic Is.		126	6,000

Asia.

	Sq. Miles.	Population.
Arctic Islands	14,896	.....
Siberia	4,899,359	5,712,000
Kirghiz Steppe	706,253	2,461,000
Russian Turk.	641,578	5,261,000
Lake Aral and Caspian Sea	195,551	.....
Transcaucasia	95,801	5,516,000
Khiva, Rus. dep'cy.	23,167	500,000
Bokhara, " "	79,154	1,500,000
Russia in Asia	*6,655,759*	*20,950,000*
Isl. of Cyprus	3,584	237,000
Turkey in Asia	683,155	17,153,000
Sinai Pen. (Egypt)	22,781	25,000
Arabia	879,984	950,000
Oman	74,842	1,000,000
Aden, etc.	15,870	252,000
Persia	635,163	9,000,000
Afghanistan	240,937	4,550,000
India Proper	1,450,734	283,060,000
Burma	264,239	10,491,000
Baluchistan	141,628	811,000
Ceylon, etc.	25,449	3,608,000
Straits Settl's.	35,571	1,452,000
Brit. India, etc.	*1,917,621*	*299,422,000*
Nepal, Bhutan	72,590	3,200,000
Port. India	1,413	572,000
French India	197	273,000
Tonkin	46,025	7,000,000
Anam	52,126	4,620,000
Laos	98,460	605,000
Cochin China	21,970	2,262,000
Cambodia	37,415	1,102,000
Kwangchau	270	60,000
Fr. Indo-China, etc.	*256,463*	*15,922,000*
Siam	244,798	6,320,000
China Proper	1,496,972	407,337,000
Manchuria	362,671	8,500,000
Mongolia	1,076,337	2,580,000
Chinese Turk.	550,001	1,200,000
Tibet	814,319	6,430,000
Chinese Empire	*4,300,900*	*426,047,000*
Hongkong and Weihaiwei	687	523,000
Kiauchau	194	84,000
Macao	4	79,000
Korea	84,251	9,670,000
Japanese Empire	177,359	50,006,000
Luzon Group	49,262	4,066,000
Visayas	21,638	2,863,000
Mindanao Gr.	37,849	580,000
Palawan Group	5,238	36,000
Sulu Islands	1,039	91,000
Philippine Is.	*115,026*	*7,636,000*
Sumatra Group	185,039	3,757,000
Java Group	50,777	25,698,000
Borneo Group	289,948	1,737,000
Celebes Group	71,784	1,998,000
Moluccas, etc.	75,344	2,411,000
As. East Indies	*787,918*	*43,237,000*

Australia, etc.

Victoria	87,884	1,201,000
New S. Wales	310,660	1,359,000
Queensland	668,497	503,000
South Australia	903,689	363,000
Western Australia	975,920	184,000
Tasmania	26,215	173,000
Natives	.....	200,000
Com. of Australia	*2,972,865*	*3,983,000*
New Zealand Gr.	104,663	816,000
New Guinea Gr.	311,032	700,000
Bismarck Arch.	18,186	190,000
Solomon Is.	13,475	200,000
New Hebrides	5,107	50,000
New Caledonia, etc.	7,634	51,000
Fiji Islands	8,046	118,000
Samoa Islands	1,076	39,000
Hawaii	4,015	47,000
Maui and Lanai	863	25,500
Kahoolawe	69	.....
Molokai	261	2,500
Oahu	600	58,500
Kauai and Niihau	641	20,500
Hawaiian Islands	*6,449*	*154,000*
Small Pacific Is.	7,911	157,000

United States, 1900.

	Pop. 1905.	Sq. Mi.	Populat'n.
Alabama	.....	51,998	1,828,697
Arkansas	.....	53,335	1,311,564
California	.....	158,297	1,485,053
Colorado	.....	103,948	539,700
Connecticut	.....	4,965	908,420
Delaware	.....	2,370	184,735
Florida	*614,845*	58,666	528,542
Georgia	.....	59,265	2,216,331
Idaho	.....	84,313	161,772
Illinois	.....	56,665	4,821,550
Indiana	.....	36,354	2,516,462
Iowa	*2,210,337*	56,147	2,231,853
Kansas ('06)	*1,611,460*	82,158	1,470,495
Kentucky	.....	40,598	2,147,174
Louisiana	.....	48,506	1,381,625
Maine	.....	33,040	694,466
Maryland	.....	12,327	1,188,044
Mass.	*3,003,680*	8,266	2,805,346
Mich. ('04)	*2,530,016*	57,980	2,420,982
Minnesota	*1,979,912*	84,682	1,751,394
Mississippi	.....	46,865	1,551,270
Missouri	.....	69,420	3,106,665
Montana	.....	146,572	243,329
Nebraska	.....	77,520	1,066,300
Nevada	.....	110,690	42,335
New Hamp.	.....	9,341	411,588
New Jersey	*2,144,143*	8,224	1,883,669
New York	*8,067,308*	49,204	7,268,894
N. Carolina	.....	52,426	1,893,810
N. Dakota	*437,070*	70,837	319,146
Ohio	.....	41,040	4,157,545
Oklahoma	.....	70,057	790,391
Oregon	.....	96,699	413,536
Pennsylvania	.....	45,126	6,302,115
Rhode Isl'd.	*480,082*	1,248	428,556
S. Carolina	.....	30,989	1,340,316
S. Dakota	*455,185*	77,615	401,570
Tennessee	.....	42,022	2,020,616
Texas	.....	265,896	3,048,710
Utah	.....	84,990	276,749
Vermont	.....	9,564	343,641
Virginia	.....	42,627	1,854,184
Washington	.....	69,127	518,103
W. Virginia	.....	24,170	958,800
Wisconsin	*2,228,949*	56,066	2,069,042
Wyoming	*101,816*	97,914	92,531
Part of the Great Lakes	.....	61,730	....
Total States		*2,851,859*	*75,397,616*

Territories (*Main Body*).

Arizona	.....	113,956	122,931
Dist. of Col.	*323,346*	70	278,718
N. Mexico	.....	122,634	195,310
Total Territories		*236,660*	*596,959*
Total main body		*3,088,519*	*75,994,575*

Outlying Territory, etc.

Alaska Ter.	.....	590,884	63,592
Hawaii Ter.	.....	6,449	154,001
Porto Rico	.....	3,435	953,243
Philippines	(*'03*)	115,026	7,635,426
Tutuila, etc.	.....	77	6,100
Guam	.....	210	9,000
Panama Canal Zone		474	(?)
Persons in the military and naval service of the U.S. stationed abroad	.....	....	91,219
Total outlying		*716,555*	*8,912,581*
Grand Total		*3,805,074*	*84,907,156*

POPULATION OF THE PRINCIPAL CITIES OF THE UNITED STATES.

	Pop. 1905	Pop. 1900
Akron, Ohio		42,728
Alameda, Cal.		16,464
Albany, N.Y.	98,374	94,151
Albuquerque, N.M.		6,238
Alexandria, Va.		14,528
Allegheny, Pa.		129,896
Allentown, Pa.		35,416
Alpena, Mich.	12,400	11,802
Altoona, Pa.		38,973
Amsterdam, N.Y.	23,943	20,929
Anaconda, Mont.		9,453
Anderson, Ind.		20,178
Annapolis, Md.		8,525
Ann Arbor, Mich.	14,599	14,509
Anniston, Ala.		9,695
Ansonia, Conn.		12,681
Appleton, Wis.	17,000	15,085
Asheville, N.C.		14,694
Ashland, Wis.	14,519	13,074
Astoria, Ore.		8,381
Atchison, Kan.	18,159	15,722
Athens, Ga.		10,245
Atlanta, Ga.		89,872
Atlantic City, N.J.	37,593	27,838
Auburn, Me.		12,951
Auburn, N.Y.	31,422	30,345
Augusta, Ga.		39,441
Augusta, Me.		11,683
Aurora, Ill.		24,147
Austin, Tex.		22,258
Baltimore, Md.		508,957
Bangor, Me.		21,850
Barre, Vt.		8,448
Bath, Me.		10,477
Baton Rouge, La.		11,269
Battle Creek, Mich.	22,213	18,563
Bay City, Mich.	27,644	27,628
Bayonne, N.J.	42,262	32,722
Belleville, Ill.		17,484
Berkeley, Cal.		13,214
Beverly, Mass.	15,223	13,884
Biddeford, Me.		16,145
Binghampton, N.Y.	42,036	39,647
Birmingham, Ala.		38,415
Bismarck, N.D.	4,913	3,319
Bloomington, Ill.		23,286
Boise, Ida.		5,957
Boston, Mass.	595,380	560,892
Bridgeport, Conn.		70,996
Brockton, Mass.	47,794	40,063
Brookline, Mass.	23,436	19,935
Buffalo, N.Y.	376,587	352,387
Burlington, Iowa.	25,318	23,201
Burlington, Vt.		18,640
Butte, Mont.		30,470
Cambridge, Mass.	97,434	91,886
Camden, N.J.	83,363	75,935
Canton, Ohio.		30,667
Carson City, Nev.		2,100
Cedar Rapids, Iowa.	28,759	25,656
Charleston, S.C.		55,807
Charleston, W. Va.		11,099
Charlotte, N.C.		18,091
Chattanooga, Tenn.		30,154
Chelsea, Mass.	37,289	34,072
Chester, Pa.		33,988
Cheyenne, Wyo.	13,656	14,087
Chicago, Ill.		1,698,575
Chicopee, Mass.	20,191	19,167
Cincinnati, Ohio.		325,902
Cleveland, Ohio.		381,768
Clinton, Iowa.	22,756	22,698
Cohoes, N.Y.	24,183	23,910
Colorado Springs, Col.		21,085
Columbia, S.C.		21,108
Columbus, Ga.		17,614
Columbus, Ohio.		125,560
Concord, N.H.		19,632
Council Bluffs, Iowa.	25,231	25,802
Covington, Ky.		42,938
Cripple Creek, Col.		10,147
Cumberland, Md.		17,128
Dallas, Tex.		42,638
Danbury, Conn.		16,537
Danville, Va.		16,520
Davenport, Iowa.	39,797	35,254
Dayton, Ohio.		85,333
Decatur, Ill.		20,754
Denver, Col.		133,859
Des Moines, Iowa.	75,626	62,139
Detroit, Mich.	317,591	285,704
Dover, Del.		3,329
Dover, N.H.		13,207
Dubuque, Iowa.	41,941	36,297
Duluth, Minn.	64,942	52,969
Easton, Pa.		25,238
East St. Louis, Ill.		29,655
Eau Claire, Wis.	18,737	17,517
Elgin, Ill.		22,433
Elizabeth, N.J.	60,509	52,130
Elmira, N.Y.	34,687	35,672
El Paso, Tex.		15,906
Erie, Pa.		52,733
Evanston, Ill.		19,259
Evansville, Ind.		59,007
Everett, Mass.	29,111	24,336
Everett, Wash.		7,838
Fall River, Mass.	105,762	104,863
Fargo, N.D.	12,512	9,589
Findlay, Ohio.		17,613
Fitchburg, Mass.	33,021	31,531
Flint, Mich.	14,884	13,103
Fond du Lac, Wis.	17,284	15,110
Fort Scott, Kan.	12,248	10,322
Fort Smith, Ark.		11,587
Fort Wayne, Ind.		45,115
Fort Worth, Tex.		26,688
Frankfort, Ky.		9,487
Frederick, Md.		9,296
Fresno, Cal.		12,470
Galesburg, Ill.		18,607
Galveston, Tex.		37,789
Glens Falls, N.Y.	14,650	12,613
Gloucester, Mass.	26,011	26,121
Gloversville, N.Y.	18,672	18,349
Grand Forks, N.D.	10,127	7,652
Grand Rapids, Mich.	95,718	87,565
Great Falls, Mont.		14,930
Green Bay, Wis.	22,854	18,684
Greensboro, N.C.		10,035
Greenville, Miss.		7,642
Greenville, S.C.		11,860
Guthrie, Okla.		10,006
Hagerstown, Md.		13,591
Hamilton, Ohio.		23,914
Hannibal, Mo.		12,780
Harrisburg, Pa.		50,167
Hartford, Conn.		79,850
Haverhill, Mass.	37,830	37,175
Helena, Mont.		10,770
Henderson, Ky.		10,272
Hoboken, N.J.	65,468	59,364
Holyoke, Mass.	49,934	45,712
Honolulu, Hawaii.		39,306
Hot Springs, Ark.		9,973
Houston, Tex.		44,633
Huntington, W. Va.		11,923
Huntsville, Ala.		8,068
Indianapolis, Ind.		169,164
Ishpeming, Mich.	11,623	13,255
Ithaca, N.Y.	14,615	13,136
Jackson, Mich.	25,300	25,180
Jackson, Miss.		7,816
Jackson, Tenn.		14,511
Jacksonville, Fla.	35,301	28,429
Jamestown, N.Y.	26,160	22,892
Janesville, Wis.	13,770	13,185
Jefferson City, Mo.		9,664
Jersey City, N.J.	232,699	206,433
Johnstown, Pa.		35,936
Joliet, Ill.		29,353
Joplin, Mo.		26,023
Kalamazoo, Mich.	29,782	24,404
Kansas City, Kan.	67,614	51,418
Kansas City, Mo.		163,752
Keene, N.H.		9,165
Keokuk, Iowa.	14,604	14,641
Key West, Fla.	20,498	17,114
Kingston, N.Y.	25,556	24,535
Knoxville, Tenn.		32,637
La Crosse, Wis.	29,078	28,895
Lafayette, Ind.		18,116
Lancaster, Pa.		41,459
Lansing, Mich.	20,276	16,485
Laramie, Wyo.	7,601	8,207
Laredo, Tex.		13,429
Las Vegas, N.M.		3,552
Lawrence, Kan.	11,708	10,862
Lawrence, Mass.	70,050	62,559
Leadville, Col.		12,445
Leavenworth, Kan.	20,934	20,735
Lebanon, Pa.		17,628
Lewiston, Me.		23,761
Lexington, Ky.		26,369
Lima, Ohio.		21,723
Lincoln, Neb.		40,169
Little Rock, Ark.		38,307
Lockport, N.Y.	17,552	16,581
Logan, Utah.		5,451
Logansport, Ind.		16,204
Los Angeles, Cal.		102,479
Louisville, Ky.		204,731
Lowell, Mass.	94,889	94,969
Lynchburg, Va.		18,891
Lynn, Mass.	77,042	68,513
Macon, Ga.		23,272
McKeesport, Pa.		34,227
Madison, Wis.	24,301	19,164
Malden, Mass.	38,037	33,664
Manchester, N.H.		56,987
Manistee, Mich.	12,708	14,260
Mankato, Minn.	10,996	10,599
Mansfield, Ohio.		17,640
Marinette, Wis.	15,354	16,195
Marion, Ind.		17,337
Marlboro, Mass.		13,609
Marquette, Mich.	10,665	10,058
Medford, Mass.	19,686	18,244
Melrose, Mass.	14,295	12,962
Menominee, Mich.	11,096	12,818
Memphis, Tenn.		102,320
Meriden, Conn.		24,296
Meridian, Miss.		14,050
Middletown, N.Y.	14,516	14,522
Milwaukee, Wis.	312,948	285,315
Minneapolis, Minn.	261,974	202,718
Mobile, Ala.		38,469
Montgomery, Ala.		30,346
Montpelier, Vt.		6,266
Mount Vernon, N.Y.	25,006	21,228
Muncie, Ind.		20,942
Muskegon, Mich.	20,897	20,818
Nashua, N.H.		23,898
Nashville, Tenn.		80,865
Natchez, Miss.		12,210
New Albany, Ind.		20,628
Newark, N.J.	283,289	246,070
Newark, Ohio.		18,157
New Bedford, Mass.	74,362	62,442
Newbern, N.C.		9,090
New Britain, Conn.		25,998
New Brunswick, N.J.	23,133	20,006
Newburgh, N.Y.	26,498	24,943
Newburyport, Mass.	14,675	14,478
Newcastle, Pa.		28,339
New Haven, Conn.		108,027
New London, Conn.		17,548
New Orleans, La.		287,104
Newport, Ky.		28,301
Newport, R.I.	25,039	22,034
Newport News, Va.		19,635
New Rochelle, N.Y.	20,480	14,720
Newton, Mass.	36,827	33,587
New York, N.Y.	4,013,781	3,437,202
Manhattan Boro.	2,112,380	1,850,093
Brooklyn "	1,358,686	1,166,582
Bronx "	271,630	200,507
Queens "	198,240	152,999
Richmond "	72,845	67,021
Niagara Falls, N.Y.	26,560	19,457
Nome, Alaska		12,488
Norfolk, Va.		46,624
Norristown, Pa.		22,265
North Adams, Mass.	22,150	24,200
Northampton, Mass.	19,957	18,643
Norwich, Conn.		17,251
Oakland, Cal.		66,960
Ogdensburg, N.Y.	13,179	12,633
Ogden, Utah.		16,313
Oklahoma, Okla.		10,037
Olympia, Wash.		3,863
Omaha, Neb.		102,555
Orange, N.J.	26,101	24,141
Oshkosh, Wis.	30,575	28,284
Oswego, N.Y.	22,572	22,199
Ottumwa, Iowa.	20,181	18,197
Owensboro, Ky.		13,189
Paducah, Ky.		19,446
Parkersburg, W.Va.		11,703
Passaic, N.J.	37,837	27,777
Paterson, N.J.	111,529	105,171
Pawtucket, R.I.	43,381	39,231
Pensacola, Fla.		17,747
Peoria, Ill.		56,100
Perth Amboy, N.J.	25,895	17,699
Petersburg, Va.		21,810
Philadelphia, Pa.		1,293,697
Phoenix, Ariz.		5,544
Pierre, S.D.	2,794	2,306
Pine Bluff, Ark.		11,496
Pittsburg, Pa.		321,616
Pittsfield, Mass.	25,001	21,766
Plainfield, N.J.	18,468	15,369
Port Huron, Mich.	20,028	19,158
Portland, Me.		50,145
Portland, Ore.		90,426
Portsmouth, N.H.		10,637
Portsmouth, Ohio.		17,870
Portsmouth, Va.		17,427
Pottsville, Pa.		15,710
Poughkeepsie, N.Y.	25,379	24,029
Providence, R.I.	198,635	175,597
Provo, Utah.		6,185
Pueblo, Col.		28,157
Quincy, Ill.		36,252
Quincy, Mass.	28,076	23,899
Racine, Wis.	32,290	29,102
Raleigh, N.C.		13,643
Reading, Pa.		78,961
Reno, Nev.		4,500
Richmond, Ind.		18,226
Richmond, Va.		85,050
Roanoke, Va.		21,495
Rochester, N.Y.	181,666	162,608
Rockford, Ill.		31,051
Rock Island, Ill.		19,493
Rome, N.Y.	16,562	15,343
Rutland, Vt.		11,499
Sacramento, Cal.		29,282
Saginaw, Mich.	46,610	42,345
St. Albans, Vt.		6,239
St. Augustine, Fla.		4,272
St. Joseph, Mo.		102,979
St. Louis, Mo.		575,238
St. Paul, Minn.	197,023	163,065
Salem, Mass.	37,627	35,956
Salem, Ore.		4,258
Salt Lake City, Utah.		53,531
San Antonio, Tex.		53,321
San Diego, Cal.		17,700
Sandusky, Ohio.		19,664
San Francisco, Cal.		342,782
San Jose, Cal.		21,500
Santa Fé, N.M.		5,603
Saratoga Springs, N.Y.	12,999	12,409
Sault Ste. Marie, Mich.	11,442	10,538
Savannah, Ga.		54,244
Schenectady, N.Y.	58,387	31,682
Scranton, Pa.		102,026
Seattle, Wash.		80,671
Sedalia, Mo.		15,231
Selma, Ala.		8,713
Shamokin, Pa.		18,202
Sheboygan, Wis.	24,026	22,962
Shenandoah, Pa.		20,321
Shreveport, La.		16,013
Sioux City, Iowa.	40,952	33,111
Sioux Falls, S.D.	12,283	10,266
Sitka, Alaska		1,396
Somerville, Mass.	69,272	61,643
South Bend, Ind.		35,999
South Omaha, Neb.		26,001
Spartanburg, S.C.		11,395
Spokane, Wash.		36,848
Springfield, Ill.		34,159
Springfield, Mass.	73,540	62,059
Springfield, Mo.		23,267
Springfield, Ohio.		38,253
Stamford, Conn.		15,997
Stillwater, Minn.	12,435	12,318
Stockton, Cal.		17,506
Superior, Wis.	36,551	31,091
Syracuse, N.Y.	117,503	108,374
Tacoma, Wash.		37,714
Tallahassee, Fla.	3,311	2,981
Tampa, Fla.	22,823	15,839
Taunton, Mass.	30,967	31,036
Terre Haute, Ind.		36,673
Toledo, Ohio.		131,822
Topeka, Kan.	37,641	33,608
Trenton, N.J.	84,180	73,307
Troy, N.Y.	76,910	60,651
Tucson, Ariz.		7,531
Utica, N.Y.	62,934	56,383
Vicksburg, Miss.		14,834
Virginia City, Nev.		2,695
Waco, Tex.		20,686
Walla Walla, Wash.		10,049
Waltham, Mass.	26,282	23,481
Washington, D.C.		278,718
Waterbury, Conn.		45,859
Watertown, N.Y.	25,447	21,696
Watervliet, N.Y.	14,600	14,321
Wheeling, W.Va.		38,878
Wichita, Kan.	31,110	24,671
Wilkes-Barre, Pa.		51,721
Williamsport, Pa.		28,757
Wilmington, Del.		76,508
Wilmington, N.C.		20,976
Winona, Minn.	20,334	19,714
Winston, N.C.		10,008
Woburn, Mass.	14,402	14,254
Woonsocket, R.I.	32,196	28,204
Worcester, Mass.	128,135	118,421
Yonkers, N.Y.	61,716	47,931
York, Pa.		33,708
Youngstown, Ohio.		44,885
Zanesville, Ohio.		23,538

POPULATION OF THE PRINCIPAL FOREIGN CITIES.

Aberdeen, Scotland	144,000	('01)	Cuzco, Peru	20,000		London, Canada	38,000	('01)	Rotterdam, Netherlands	370,000	('04)
Adelaide, Australia	163,000	('01)	Damascus, Turkey	225,000		London, England	4,537,000	('01)	Roubaix, France	142,000	('01)
Alexandria, Egypt	320,000	('97)	Delhi, India	209,000	('01)	Lucknow, India	264,000	('01)	Rouen, France	116,000	('01)
Algiers, Algeria	97,000	('01)	Dortmund, Germany	176,000	('05)	Lyons, France	459,000	('01)	Saigon, French Indo-China	48,000	('01)
Altona, Germany	168,000	('05)	Dresden, Germany	514,000	('05)	Madras, India	509,000	('01)	St. Etienne, France	147,000	('01)
Amsterdam, Netherlands	551,000	('04)	Dublin, Ireland	291,000	('01)	Madrid, Spain	540,000	('00)	St. John, Canada	41,000	('01)
Antofagasta, Chile	16,000	('03)	Duisburg, Germany	192,000	('05)	Magdeburg, Germany	241,000	('05)	St. Johns, Newfoundland	30,000	('01)
Antwerp, Belgium	292,000	('04)	Dundee, Scotland	161,000	('01)	Malaga, Spain	130,000	('00)	St. Louis, Senegal	24,000	
Arequipa, Peru	35,000		Dunedin, New Zealand	25,000	('01)	Managua, Nicaragua	30,000	('00)	St. Petersburg, Russia	1,267,000	('97)
Asuncion, Paraguay	52,000	('00)	Dusseldorf, Germany	253,000	('05)	Manchester, England	544,000	('01)	Salford, England	221,000	('01)
Athens, Greece	112,000	('96)	Edinburgh, Scotland	317,000	('01)	Mandalay, Burma	184,000	('01)	Saloniki, Turkey	105,000	
Auckland, New Zealand	84,000	('01)	Essen, Germany	231,000	('05)	Manila, Philippine Islands	220,000	('03)	San Jose, Costa Rica	26,000	('04)
Bagdad, Turkey	145,000		Fez, Morocco	140,000		Maracaibo, Venezuela	34,000	('94)	San Juan, Porto Rico	32,000	('99)
Bahia, Brazil	175,000	('90)	Florence, Italy	206,000	('01)	Maranhão, Brazil	29,000	('90)	San Luis Potosi, Mexico	61,000	('00)
Baku, Transcaucasia	112,000	('97)	Frankfurt am Main, Germany	335,000	('05)	Marseilles, France	491,000	('01)	San Salvador, Salvador	60,000	('01)
Ballarat, Australia	50,000	('01)	Fredericton, Canada	7,000	('01)	Maskat, Oman	40,000		Santiago, Chile	335,000	('03)
Bangkok, Siam	400,000		Fuchau, China	624,000	('04)	Matanzas, Cuba	36,000	('99)	Santiago de Cuba	43,000	('99)
Barcelona, Spain	533,000	('00)	Geneva, Switzerland	105,000	('01)	Mecca, Turkey	60,000		Santos, Brazil	15,000	
Barfrush, Persia	50,000		Genoa, Italy	235,000	('01)	Medellin, Colombia	53,000	('02)	São Paulo, Brazil	65,000	('90)
Barranquilla, Columbia	55,000	('02)	Georgetown, British Guiana	53,000	('91)	Melbourne, Australia	496,000	('01)	Seoul, Korea	197,000	('02)
Basel, Switzerland	111,000	('01)	Ghent, Belgium	162,000	('04)	Messina, Italy	150,000	('01)	Seville, Spain	148,000	('00)
Batavia, Java	116,000	('01)	Glasgow, Scotland	736,000	('01)	Mexico, Mexico	345,000	('00)	Shanghai, China	651,000	('04)
Beirut, Turkey	120,000		Gothenburg, Sweden	131,000	('00)	Milan, Italy	492,000	('01)	Sheffield, England	381,000	('01)
Belfast, Ireland	349,000	('01)	Gratz, Austria	138,000	('00)	Mollendo, Peru	3,000		Singapore, Straits Settlements	229,000	('01)
Belgrade, Servia	70,000	('01)	Guadalajara, Mexico	101,000	('00)	Monterey, Mexico	62,000	('00)	Smyrna, Turkey	201,000	
Benares, India	209,000	('01)	Guayaquil, Ecuador	51,000		Montevideo, Uruguay	276,000	('02)	Sofia, Bulgaria	68,000	('00)
Bergen, Norway	72,000	('00)	Hague, Netherlands	234,000	('04)	Montreal, Canada	268,000	('01)	Stettin, Germany	224,000	('05)
Berlin, Germany	2,040,000	('05)	Haidarabad, India	449,000	('01)	Morocco, Morocco	45,000		Stockholm, Sweden	301,000	('00)
Bern, Switzerland	65,000	('01)	Halifax, Canada	41,000	('01)	Moscow, Russia	989,000	('97)	Strassburg, Germany	167,000	('05)
Bilbao, Spain	83,000	('00)	Hamburg, Germany	803,000	('05)	Mukden, Manchuria	200,000		Stuttgart, Germany	249,000	('05)
Birmingham, England	522,000	('01)	Hamilton, Canada	53,000	('01)	Munich, Germany	538,000	('05)	Suchau, China	500,000	('04)
Bloemfontein, Orange River Col.	34,000	('04)	Hangchau, China	300,000	('04)	Nagoya, Japan	289,000	('03)	Sucre, Bolivia	21,000	('00)
Bogota, Colombia	120,000	('02)	Hankau, China	870,000	('04)	Nantes, France	133,000	('01)	Sydney, Australia	482,000	('01)
Bologna, Italy	152,000	('01)	Hanover, Germany	250,000	('05)	Naples, Italy	564,000	('01)	Tabriz, Persia	200,000	
Bombay, India	776,000	('01)	Havana, Cuba	236,000	('99)	Newcastle, England	215,000	('01)	Talca, Chile	43,000	('03)
Bordeaux, France	258,000	('01)	Havre, France	130,000	('01)	New Guatemala, Guatemala	97,000	('04)	Tananarivo, Madagascar	55,000	('01)
Bradford, England	280,000	('01)	Hobart, Tasmania	25,000	('01)	Ningpo, China	260,000	('04)	Tashkend, Turkestan	157,000	('97)
Bremen, Germany	215,000	('05)	Hull, England	241,000	('01)	Nottingham, England	240,000	('01)	Tegucigalpa, Honduras	35,000	
Breslau, Germany	417,000	('05)	Iquique, Chile	43,000	('03)	Nuremberg, Germany	294,000	('05)	Teheran, Persia	280,000	
Brisbane, Australia	120,000	('01)	Irkutsk, Siberia	52,000	('97)	Odessa, Russia	405,000	('97)	Tientsin, China	750,000	('04)
Bristol, England	329,000	('01)	Ispahan, Persia	80,000		Oporto, Portugal	168,000	('00)	Tiflis, Transcaucasia	161,000	('97)
Brussels, Belgium	599,000	('04)	Jerusalem, Turkey	42,000		Oran, Algeria	88,000	('01)	Tiumen, Siberia	30,000	('97)
Bucharest, Roumania	282,000	('99)	Johannesburg, Transvaal Colony	159,000	('04)	Osaka, Japan	996,000	('03)	Tokyo, Japan	1,819,000	('03)
Budapest, Hungary	732,000	('00)	Kabul, Afghanistan	100,000		Ottawa, Canada	60,000	('01)	Toronto, Canada	208,000	('01)
Buenos Aires, Argentina	1,000,000	('05)	Kandahar, Afghanistan	50,000		Palermo, Italy	310,000	('01)	Toulouse, France	150,000	('01)
Bushire, Persia	20,000		Kharkof, Russia	175,000	('97)	Panama, Panama	30,000		Trebizond, Turkey	35,000	
Cairo, Egypt	570,000	('97)	Kief, Russia	247,000	('97)	Para, Brazil	50,000	('90)	Trieste, Austria	134,000	('00)
Calcutta, India	1,127,000	('01)	Kimberley, Cape Colony	34,000	('04)	Paramaribo, Dutch Guiana	32,000	('00)	Tripoli, Tripoli	30,000	
Callao, Peru	16,000	('90)	Konigsberg, Germany	220,000	('05)	Paris, France	2,714,000	('01)	Tucuman, Argentina	55,000	('05)
Canton, China	900,000	('04)	Kyoto, Japan	381,000	('03)	Peking, China	1,000,000 ?		Tunis, Tunis	250,000	
Cape Town, Cape Colony	78,000	('04)	La Guaira, Venezuela	14,000		Pernambuco, Brazil	112,000	('90)	Turin, Italy	336,000	('01)
Caracas, Venezuela	73,000	('94)	Lahore, India	203,000	('01)	Perth, Australia	36,000	('01)	Valencia, Spain	214,000	('00)
Cardiff, Wales	164,000	('01)	La Paz, Bolivia	55,000	('00)	Port Elizabeth, Cape Colony	33,000	('04)	Valencia, Venezuela	39,000	('94)
Catania, Italy	150,000	('01)	La Plata, Argentina	85,000	('05)	Porto Alegre, Brazil	53,000	('90)	Valparaiso, Chile	144,000	('03)
Cayenne, French Guiana	13,000	('01)	Lassa, Tibet	25,000		Port Said, Egypt	42,000	('97)	Vancouver, Canada	26,000	('01)
Cetinje, Montenegro	3,000		Leeds, England	429,000	('01)	Portsmouth, England	189,000	('01)	Venice, Italy	152,000	('01)
Charlottetown, Canada	12,000	('01)	Leghorn, Italy	98,000	('01)	Prague, Austria	202,000	('00)	Vera Cruz, Mexico	29,000	('00)
Chemnitz, Germany	244,000	('05)	Leicester, England	212,000	('01)	Pretoria, Transvaal Colony	10,000		Victoria, Canada	21,000	('01)
Chillan, Chile	37,000	('03)	Leipzig, Germany	503,000	('05)	Puebla, Mexico	94,000	('00)	Vienna, Austria	1,675,000	('00)
Christiania, Norway	228,000	('00)	Lemberg, Austria	160,000	('00)	Quebec, Canada	69,000	('01)	Vilna, Russia	155,000	('97)
Cochabamba, Bolivia	22,000	('00)	Leon, Mexico	65,000	('00)	Quito, Ecuador	80,000		Vladivostok, Siberia	29,000	('97)
Cologne, Germany	429,000	('05)	Liege, Belgium	167,000	('04)	Rangoon, Burma	235,000	('01)	Warsaw, Russia	638,000	('97)
Colombo, Ceylon	158,000	('01)	Lille, France	211,000	('01)	Rheims, France	108,000	('01)	Wellington, New Zealand	44,000	('01)
Concepcion, Chile	50,000	('03)	Lima, Peru	130,000	('03)	Riga, Russia	256,000	('97)	Winnipeg, Canada	42,000	('01)
Constantinople, Turkey	1,125,000		Lisbon, Portugal	357,000	('00)	Rio de Janeiro, Brazil	750,000	('00)	Yokohama, Japan	326,000	('03)
Copenhagen, Denmark	378,000	('01)	Liverpool, England	685,000	('01)	Rome, Italy	463,000	('01)	Zanzibar, Africa	60,000	
Cordova, Argentina	53,000	('05)	Lodz, Russia	315,000	('97)	Rosario, Argentina	131,000	('05)	Zurich, Switzerland	153,000	('01)

HEIGHTS OF MOUNTAINS AND PLATEAUS.

	Feet.		Feet.		Feet.
Abyssinian Highland	6,500	Demavend, volcano, Persia	18,846	Mexican Plateau, Mexico	7,500
Aconcagua, Argentina	23,082	Elburz, Mount, Caucasus	18,493	Mitchell, Mount, North Carolina	6,711
Alps, Switzerland	8,500	Etna, volcano, Sicily	10,874	Mongolian Plateau, Asia	3,500
Altai Mountains, Mongolia	6,300	Everest, Mount, Nepal	29,002	Orizaba, volcano, Mexico	18,314
Andes, South America	13,000	Fremont Peak, Wyoming	13,790	Pikes Peak, Colorado	14,111
Apennines, Italy	4,000	Fujiyama, volcano, Japan	14,177	Popocatepetl, volcano, Mexico	17,784
Appalachian Mountains, U. S	2,500	Guiana Plateau	2,000	Pyrenees Mountains, Spain	8,000
Atlas Mountains, Africa	9,000	Hecla, volcano, Iceland	5,110	Rainier, Mount, Washington	14,363
Australian Mountains, E. Australia	5,000	Himalaya Mountains, Asia	19,000	Rocky Mountain Highland, U. S	5,000
Balkan Mountains, Europe	4,500	Hindu-Kush, Afghanistan	18,000	Rocky Mountains, North America	10,000
Blanc, Mont, France	15,744	Hooker, Mount, Canada	12,000	Sahama, volcano, Bolivia	22,350
Bohmerwald, Austria-Hungary	2,500	Iran Plateau, Persia	5,000	Shasta, Mount, California	14,380
Bolivian Plateau	12,500	Jura Mountains, France	3,000	Sierra Nevada, United States	9,000
Brazilian Plateau	2,000	Karakoram Mountains, Tibet	18,500	Sorata, Bolivia	21,286
Carpathian Mountains, Aus.-Hun	5,000	Kenia, Mount, Africa	18,000	St. Elias, Mount, Alaska	18,024
Cascade Mountains, North America	9,000	Kilimanjaro, Africa	20,000	Thian Shan, Asia	18,000
Caucasus Mountains, Russia	10,000	Kiolen Mountains, Norway	3,000	Tibet Plateau	15,000
Chimborazo, volcano, Ecuador	20,517	Kuenlun, Tibet	18,000	Ural Mountains, Russia	3,500
Coast Ranges, United States	3,000	Longs Peak, Colorado	14,271	Vesuvius, volcano, Italy	4,205
Cotopaxi, volcano, Ecuador	16,291	Mauna Kea, Hawaii	13,953	Washington, Mount, N. H	6,279
Dekkan Plateau, India	2,000	McKinley, Mount, Alaska	20,464	Whitney, Mount, California	14,502

WEALTH AND EARNINGS.

(*Mulhall*)

	Wealth in million dollars.	Annual Earnings in million dollars.	Av'ge An. Earn. per money earner.	Av'ge Inhab. per sq mile.
United States (main body)	78,480	14,957	$473	25
Great Britain and Ireland	56,668	6,830	406	344
France	46,512	5,755	333	188
Germany	38,650	6,163	258	288
European Russia	30,840	4,819	100	52
Austria-Hungary	21,658	3,394	164	180
Italy	15,168	2,093	160	293
Spain	11,424	1,310	179	95
Belgium	4,742	869	296	609
Netherlands	4,224	595	275	408
Sweden and Norway	3,792	682	212	25
Denmark	2,429	288	290	164
Switzerland	2,362	336	278	208
Portugal	1,973	307	175	143
Greece	1,066	134	125	97
Balkan States	4,925	706	137	113
Total Europe (exc. Turkey)	*246,434*	*34,281*	*207*	*105*
Australia and New Zealand	5,165	1,032	580	1
Canada	4,814	878	363	1
Argentina	2,957	456	254	4

RIVERS AND THEIR BASINS.

River System.	An. Rainfall in Basin. Cubic Miles.	Area of Basin. Square Miles.	Longest Stream. Miles.
Amazon (exc. Tocantins)	2,833.8	2,320,000	3,400
Kongo	1,213.0	1,500,000	2,800
Plata	1,035.4	1,150,000	2,500
Nile	892.1	1,300,000	3,900
Mississippi	673.0	1,250,000	4,200
Orinoco	603.3	425,000	1,500
Niger	570.0	1,000,000	2,900
Ganges-Brahmaputra	548.7	600,000	1,800
Yangtze	408.8	690,000	3,100
St. Lawrence	338.9	565,000	2,100
Yenisei	330.0	1,500,000	3,000
Zambezi	300.0	580,000	1,600
Obi	280.0	1,100,000	3,000
Lena	270.0	900,000	2,800
Amur	240.0	780,000	2,700
São Francisco	218.4	210,000	1,800
Mekong	200.0	280,000	2,600
Danube	198.7	320,000	1,800
Irawadi	180.8	180,000	(?)
Volga	152.3	590,000	2,300
Yukon	150.0	380,000	2,000
Murray	140.0	350,000	1,100
Nelson-Saskatchewan	130.0	470,000	1,900
Hoang	117.7	390,000	2,800
Magdalena	116.7	90,000	1,100
Mackenzie	115.0	680,000	2,100
Rio Grande	113.6	230,000	1,800
Indus	104.4	360,000	1,900
Columbia	90.0	290,000	1,400
Euphrates	60.0	490,000	2,000
Dnieper	56.0	197,000	1,300
Colorado	55.0	230,000	1,000
Orange	50.9	270,000	1,200
Po	23.9	27,000	460

LAKES.

	Area. Sq. Miles.	Altitude. Feet.	Depth. Feet.
Caspian	168,765±	−85±	3,096±
Victoria	32,167	4,000?	620
Superior	31,200	602	1,008
Aral	26,766±	158±	220±
Huron	23,800	581	702
Michigan	22,450	581	870
Tanganyika	14,000	2,670	1,300±
Baikal	13,197	1,400?	4,500
Tchad	10,400±	1,100±	20±
Eric	9,960	573	210
Winnipeg	9,400	710	72
Balkash	8,550±	900±	135±
Ontario	7,240	247	738
Ladoga	7,000	55	732
Titicaca	3,261	12,500	925
Nicaragua	2,800	108	320
Great Salt Lake	2,300±	4,200±	50±
Dead Sea	353	−1,290±	1,308±

INDEX AND PRONOUNCING VOCABULARY

KEY. — VOWELS: **ā** in **lāte**, **ă** in **făt**, **â** in **câre**, **ä** in **färm**, **å** in **låst**, **ą** in **fąll**, **ạ** in **wạs**, **a** in **finạl**, **au** in **author**; **ē** in **mē**, **ĕ** in **mĕt**, **bĕrry**, **e͟** in **ve͟il**, **ē͟** in **tē͟rm**, **e͟** in **nove͟l**; **ī** in **fīne**, **ĭ** in **tĭn**, **ï** in **polïce**; **ō** in **nōte**, **ŏ** in **nŏt**, **ȯ** in **sȯn**, **ô** in **fôr**, **o͟** in **do͟**, **ọ** in **wọlf**; **ū** in **tūne**, **ŭ** in **nŭt**, **u͟** in **ru͟de** (= **o͟**), **ụ** in **fụll**, **ü** = French **u**, **ua** = **wa**, **ue** = **we**; **ȳ** in **mȳ**, **ў** in **hўmn**. CONSONANTS: **ç** in **çent**, **maçhine**, **c** in **can**; **ġ** in **ġem**, **g͟** in **g͟et**; **K** = German **ch**; **n̨** = **ng**, **ñ** like **ny** in **barnyard**, **N** = **ng** in its effect (nasal) on the preceding vowel, but is itself silent; **s̨** = **z**; **th** in **thine**; **x̱** = **gz**. *Italic letters are silent.*

NORTH AMERICA

SCALE OF MILES
0 100 200 300 400 500 600 700 800 900 1000

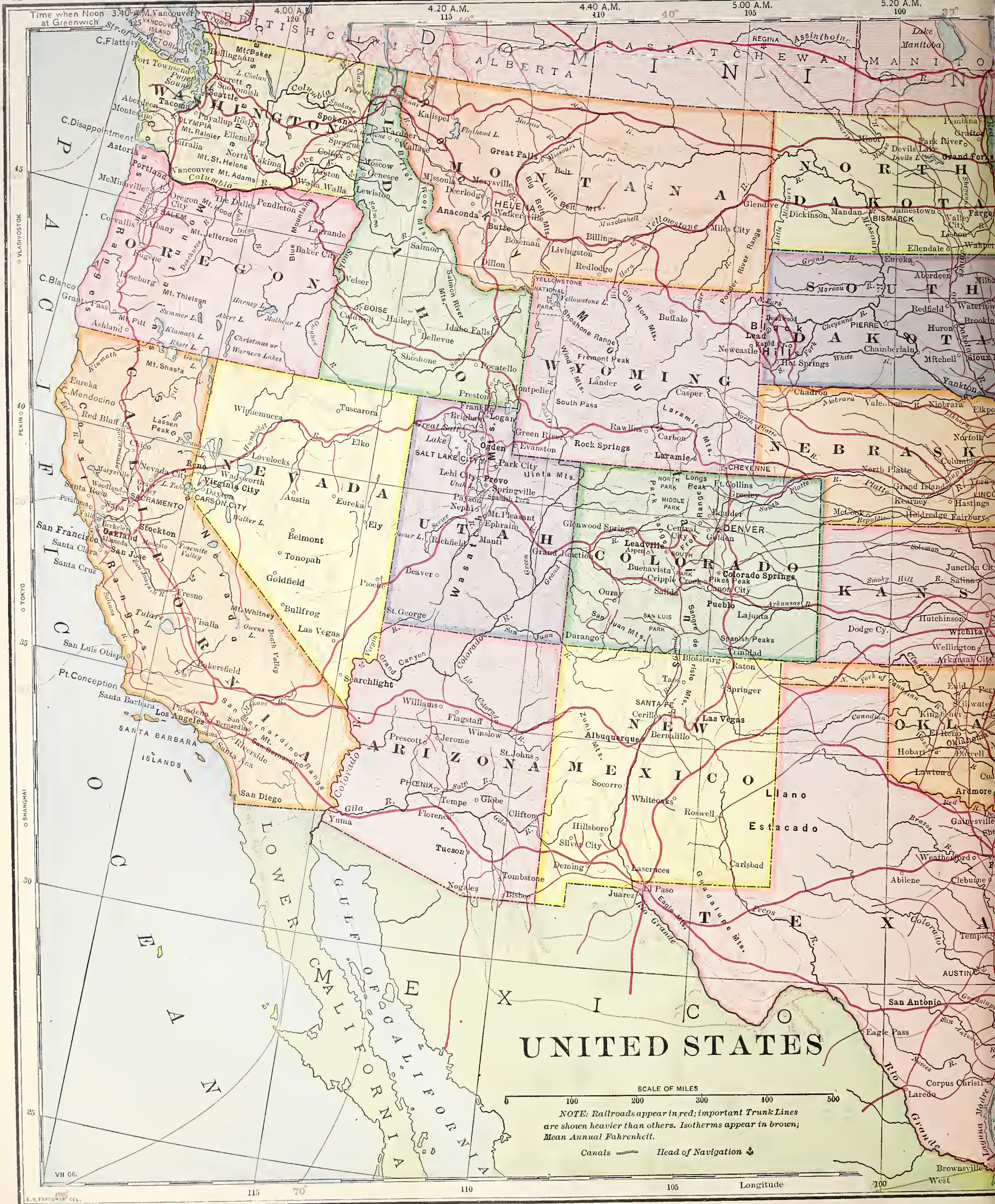
NOTE: Railroads appear in red; important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.

Canals —— *Head of Navigation* ⚓

ISTHMUS OF PANAMA

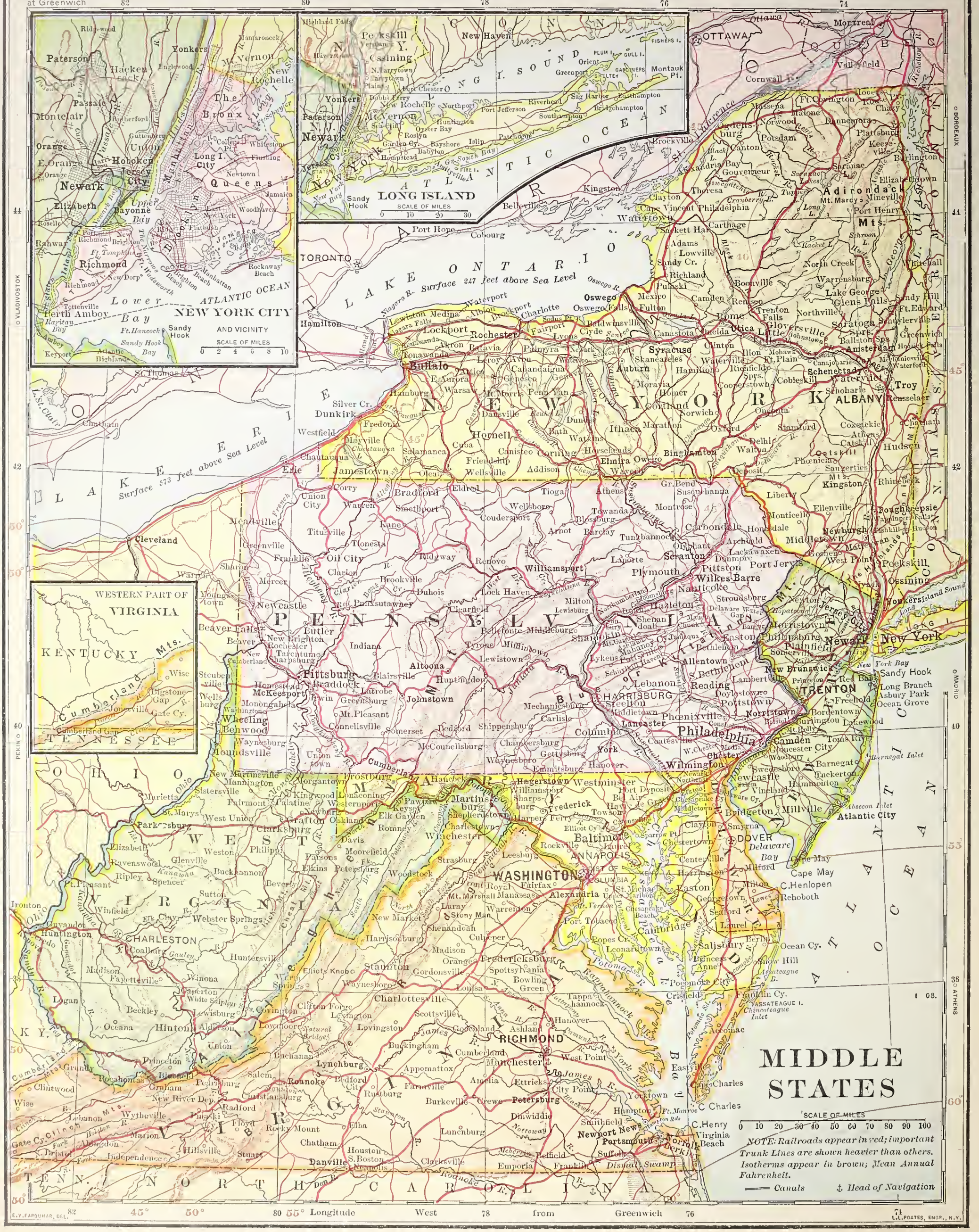
SCALE OF MILES
0 5 10 15

E.Y. FARQUHAR, DEL. — L.L. POATES, ENGR, N.Y.


Time when Noon at Greenwich
3.40 A.M.
4.00 A.M.
4.20 A.M.
4.40 A.M.
5.00 A.M.
5.20 A.M.
125
120
115
110
105
100
45
40
35
30
25
40°
70°
VLADIVOSTOK
PEKIN
TOKYO
SHANGHAI
BRITISH COLUMBIA
DOMINION
ALBERTA
SASKATCHEWAN
MANITOBA
REGINA
Assiniboine
Lake Manitoba
Vancouver
VANCOUVER ISLAND
VICTORIA
Fraser
Str. of Juan de Fuca
C. Flattery
Port Townsend
Puget Sound
WASHINGTON
Mt. Baker
Bellingham
L. Chelan
Everett
Snohomish
Seattle
Tacoma
Aberdeen
Montesano
C. Disappointment
OLYMPIA
Puyallup
Roslyn
Mt. Rainier
Ellensburg
Centralia
North Yakima
Mt. St. Helens
Vancouver
Mt. Adams
Columbia R.
Spokane
Sprague
Colfax
Dayton
Walla Walla
Snake
Cascade
Astoria
Portland
McMinnville
Oregon City
Mt. Hood
The Dalles
Pendleton
SALEM
Corvallis
Albany
Mt. Jefferson
John Day R.
Blue Mountains
Lagrande
Baker City
OREGON
Eugene
Deschutes
Coast Range
C. Blanco
Roseburg
Mt. Thielson
Harney L.
Malheur L.
Grants Pass
Summer L.
Abert L.
Mt. Pitt
Ashland
Klamath L.
Rhett L.
Christmas or Warners Lakes
Owyhee
Goose L.
IDAHO
Moscow
Genesee
Lewiston
Wardner
Wallace
Bitter Root Mts.
Salmon R.
Salmon
Salmon River Mts.
Weiser
BOISE
Caldwell
Hailey
Bellevue
Idaho Falls
Shoshone
Pocatello
Preston
Kalispel
Flathead L.
MONTANA
Great Falls
Missouri
Belt
Missoula
Deerlodge
Marysville
HELENA
Walkersville
Anaconda
Butte
Big Belt Mts.
Little Belt Mts.
Musselshell
Bozeman
Livingston
Billings
Yellowstone
Miles City
Glendive
Dillon
Redlodge
Powder River Range
NORTH DAKOTA
Pembina
Grafton
Park River
Minot
Devils Lake
Grand Forks
Dickinson
Mandan
BISMARCK
Jamestown
Valley City
Fargo
Lisbon
Ellendale
Wahpeton
SOUTH DAKOTA
Eureka
Aberdeen
Moreau R.
Grand R.
Redfield
Watertown
Brookings
Huron
Cheyenne R.
PIERRE
Deadwood
Lead
Black Hills
Rapid Cy.
Newcastle
Hot Springs
Chamberlain
Mitchell
Sioux Falls
Yankton
White R.
YELLOWSTONE NATIONAL PARK
Yellowstone L.
Shoshone Range
Big Horn Mts.
Buffalo
Fremont Peak
Wind R. Mts.
WYOMING
Lander
South Pass
Casper
Laramie Mts.
Rawlins
Carbon
Green River
Rock Springs
Evanston
Laramie
CHEYENNE
North Platte
NEBRASKA
Chadron
Niobrara
Valentine
Elkhorn
Norfolk
Columbus
North Platte
Grand Island
Kearney
Hastings
McCook
Holdredge
Fairbury
Republican
CALIFORNIA
Klamath
Mt. Shasta
Eureka
C. Mendocino
Red Bluff
Lassen Peak
Chico
Pyramid L.
Marysville
Nevada City
Grass Valley
L. Tahoe
Woodland
Santa Rosa
Petaluma
Napa
SACRAMENTO
Vallejo
Berkeley
Oakland
Alameda
Stockton
San Francisco
Santa Clara
San Jose
Santa Cruz
Modesto
Yosemite Valley
San Joaquin R.
Fresno
Tulare L.
Visalia
Mt. Whitney
Owens L.
Death Valley
Sierra Nevada
Coast Ranges
Salinas
San Luis Obispo
Bakersfield
Pt. Conception
Santa Barbara
Los Angeles
Pasadena
San Bernardino
Pomona
Riverside
Santa Ana
Mt. San Bernardino
San Bernardino Range
SANTA BARBARA ISLANDS
San Diego
Mohave R.
NEVADA
Winnemucca
Tuscarora
Humboldt
Elko
Lovelocks
Reno
Wadsworth
Virginia City
Dayton
CARSON CITY
Walker L.
Austin
Eureka
Ely
Belmont
Tonopah
Goldfield
Bullfrog
Las Vegas
Pioche
Searchlight
UTAH
Franklin
Logan
Brigham
Great Salt Lake
Ogden
SALT LAKE CITY
Park City
Uinta Mts.
Lehi City
Provo
Utah L.
Springville
Spanish Fork
Payson
Nephi
Mt. Pleasant
Ephraim
Manti
Sevier R.
Sevier L.
Richfield
Wasatch Mts.
Beaver
St. George
Green R.
Grand R.
COLORADO
NORTH PARK
Longs Peak
Ft. Collins
Greeley
MIDDLE PARK
Park Range
Boulder
Glenwood Springs
Central City
DENVER
Golden
Leadville
Aspen
SOUTH PARK
Grand Junction
Buenavista
Cripple Creek
Pikes Peak
Colorado Springs
Salida
Canon City
Ouray
Pueblo
Arkansas R.
Lajunta
SAN LUIS PARK
San Juan Mts.
Sangre de Cristo Mts.
Durango
Spanish Peaks
Trinidad
KANSAS
Solomon R.
Smoky Hill R.
Junction City
Salina
Hutchinson
Dodge Cy.
Wichita
Wellington
Arkansas City
ARIZONA
Grand Canyon
Colorado R.
Little Colorado
Williams
Flagstaff
Winslow
Prescott
Jerome
St. Johns
PHŒNIX
Salt R.
Tempe
Globe
Clifton
Gila R.
Yuma
Florence
Tucson
Tombstone
Nogales
Bisbee
NEW MEXICO
Blossburg
Raton
Taos
Springer
SANTA FE
Cerillos
Las Vegas
Zuni Mts.
Albuquerque
Bernalillo
Socorro
Whiteoaks
Roswell
Hillsboro
Silver City
Deming
Lascruces
Carlsbad
Llano Estacado
OKLAHOMA
Cimarron
N. Fork of Canadian
Enid
Kingfisher
Stillwater
El Reno
Oklahoma
Canadian
Hobart
Purcell
Lawton
Ardmore
Red R.
TEXAS
El Paso
Juarez
Eagle Mts.
Guadalupe Mts.
Pecos R.
Brazos R.
Gainesville
Weatherford
Abilene
Cleburne
Colorado
Temple
AUSTIN
San Antonio
Guadalupe
San Antonio
Eagle Pass
Nueces R.
Corpus Christi
Laredo
Rio Grande
Laguna Madre
Brownsville
PACIFIC OCEAN
LOWER CALIFORNIA
GULF OF CALIFORNIA
MEXICO
UNITED STATES
SCALE OF MILES
0 100 200 300 400 500
NOTE: Railroads appear in red; important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.
Canals
Head of Navigation
Longitude
West
VII 06.
E. V. FARQUHAR, DEL.


5.40 A.M.
6.00 A.M.
6.20 A.M.
6.40 A.M.
7.00 A.M.
7.20 A.M.
95
90
85
80
75
70
from
Greenwich
C A N A D A
O N T A R I O
Q U E B E C
NEW BRUNSWICK
LAKE SUPERIOR
Lake Nipigon
Lake of the Woods
Rainy L.
ISLE ROYALE
L. HURON
GREAT MANITOULIN
Strait of Mackinac
L. MICHIGAN
L. ONTARIO
L. ERIE
St. Lawrence R.
OTTAWA
Montreal
QUEBEC
TORONTO
Kingston
Hamilton
Port Arthur
MINNESOTA
WISCONSIN
MICHIGAN
IOWA
ILLINOIS
INDIANA
OHIO
MISSOURI
KENTUCKY
TENNESSEE
ARKANSAS
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
LOUISIANA
NORTH CAROLINA
SOUTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
VERMONT
NEW HAMPSHIRE
MAINE
MASSACHUSETTS
CONNECTICUT
NEW JERSEY
DELAWARE
ST. PAUL
Minneapolis
Duluth
MADISON
Milwaukee
Chicago
LANSING
Detroit
DES MOINES
SPRINGFIELD
INDIANAPOLIS
COLUMBUS
Cincinnati
St Louis
JEFFERSON CITY
Kansas City
FRANKFORT
Louisville
NASHVILLE
Memphis
LITTLE ROCK
JACKSON
New Orleans
BATON ROUGE
MONTGOMERY
ATLANTA
COLUMBIA
RALEIGH
RICHMOND
WASHINGTON
Baltimore
Philadelphia
HARRISBURG
Pittsburg
New York
ALBANY
BOSTON
CONCORD
MONTPELIER
AUGUSTA
Portland
PROVIDENCE
HARTFORD
TRENTON
DOVER
ANNAPOLIS
CHARLESTON
Charleston
Savannah
TALLAHASSEE
Jacksonville
Tampa
Key West
Galveston
Houston
Delta of the Mississippi R.
Chesapeake Bay
C. Hatteras
C. Cod
A T L A N T I C   O C E A N
G U L F   O F   M E X I C O
Florida Strait
BAHAMA ISLANDS
NASSAU
45
40
35
30
25
BORDEAUX
ROME
ALGIERS
CAIRO
CANTON
C.L. COATES, ENGR., N.Y.

MIDDLE STATES



NEW ENGLAND STATES

SCALE OF MILES
0 10 20 30 40 50 60 70 80 90 100

NOTE: Railroads appear in red; important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.

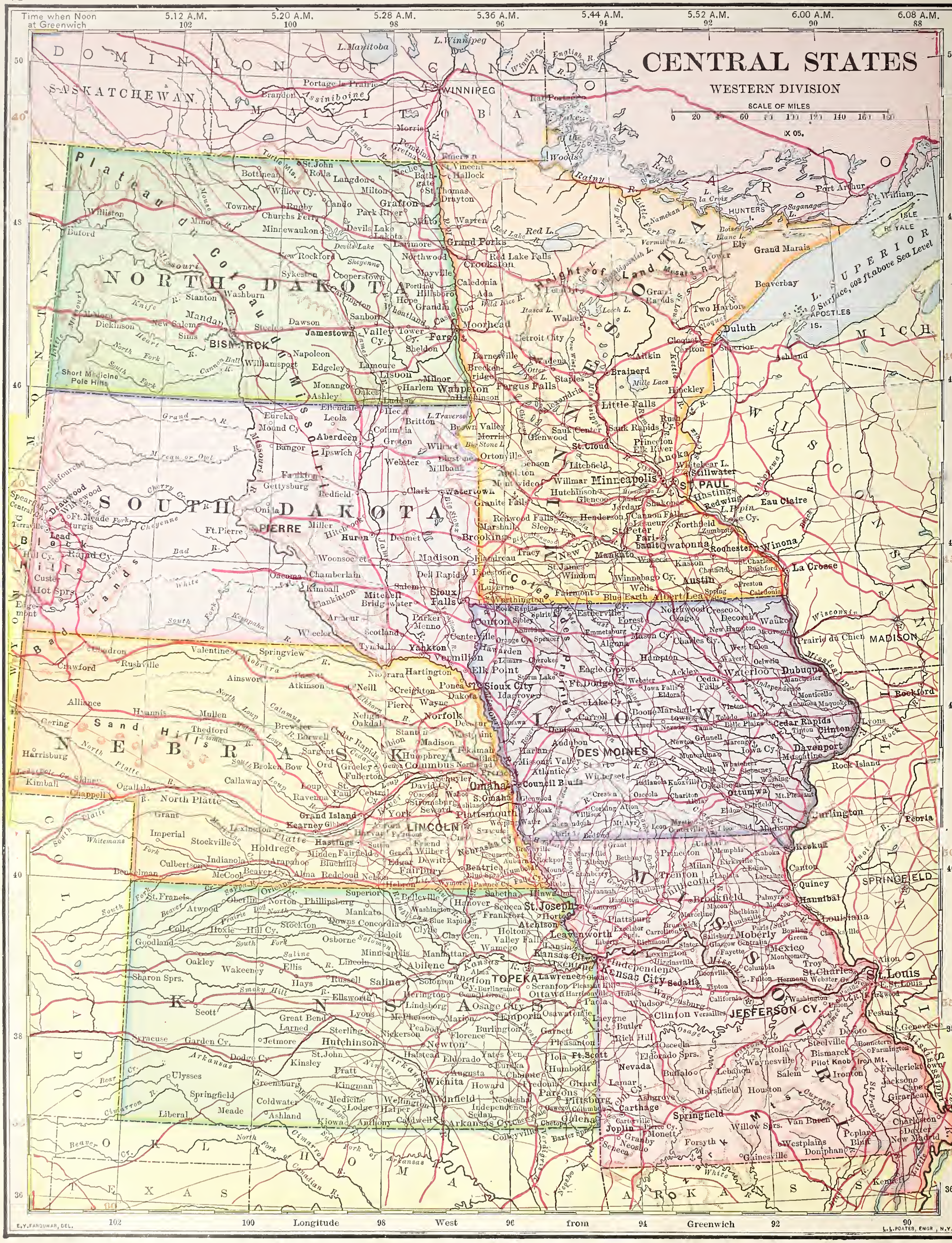
Canals — *Head of Navigation* ⚓

BOSTON AND VICINITY
SCALE OF MILES
0 1 2 3 4 5 6 7 8 9 10

7.04 A.M. Time when Noon at Greenwich
7.08 A.M. 7.12 A.M. 7.16 A.M. 7.20 A.M. 7.24 A.M. 7.28 A.M. 7.32 A.M.
74 73 72 71 70 69 68 67

Longitude 73 72 71 70 69 68 West from Greenwich

E.Y. FARQUHAR, DEL. L.L. POATES, ENGR., N.Y.


CENTRAL STATES
WESTERN DIVISION
SCALE OF MILES
0 20 40 60 80 100 120 140 160 180
Time when Noon at Greenwich
5.12 A.M. 102
5.20 A.M. 100
5.28 A.M. 98
5.36 A.M. 96
5.44 A.M. 94
5.52 A.M. 92
6.00 A.M. 90
6.08 A.M. 88
102 100 Longitude 98 West 96 from 94 Greenwich 92 90
E.Y. FARQUHAR, DEL.
L.L. POATES, ENGR., N.Y.
DOMINION OF CANADA
SASKATCHEWAN
MANITOBA
ONTARIO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
IOWA
MINNESOTA
MISSOURI
WISCONSIN
ILLINOIS
MICH.
MONTANA
WYOMING
COLORADO
OKLAHOMA
TEXAS
ARKANSAS
L. SUPERIOR Surface, 602 ft. above Sea Level
WINNIPEG
BISMARCK
PIERRE
LINCOLN
TOPEKA
DES MOINES
ST. PAUL
Minneapolis
Duluth
JEFFERSON CY.
St. Louis
Kansas City
Omaha
MADISON
SPRINGFIELD

CENTRAL STATES

EASTERN DIVISION

SCALE OF MILES

0 20 40 60 80 100 120

Time when Noon at Greenwich: 5.52 A.M. | 6.00 A.M. | 6.08 A.M. | 6.16 A.M. | 6.24 A.M. | 6.32 A.M. | 6.40 A.M.

Longitude West from Greenwich: 92 | 90 | 88 | 86 | 84 | 82 | 80

Latitude: 46 | 44 | 42 | 40 | 38

CHICAGO AND VICINITY
SCALE OF MILES 0 1 2 3 4

Surface, 602 feet above Sea Level

Surface, 582 feet above Sea Level

Surface, 573 feet above Sea Level

E.Y. FARQUHAR, DEL. L.L. POATES, ENGR., N.Y.

SOUTHERN STATES

EASTERN DIVISION

SCALE OF MILES

0 20 40 60 80 100 120 140 160 180 200

NOTE: Railroads appear in red; important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.

Canals — *Head of Navigation* ⚓

Time when Noon at Greenwich: 6.00 A.M. 90 · 6.08 A.M. 88 · 6.16 A.M. 86 · 6.24 A.M. 84 · 6.32 A.M. 82 · 6.40 A.M. 80 · 6.48 A.M. 78 · 6.56 A.M. 76

Longitude West from Greenwich: 90 88 86 84 82 80 78

E.Y. FARQUHAR, DEL. L.L. POATES, ENGR., N.Y.

Time when Noon at Greenwich 5.04 A.M. 5.12 A.M. 5.20 A.M. 5.28 A.M. 5.36 A.M. 5.44 A.M. 5.52 A.M. 6.00 A.M.

106 104 102 100 98 96 94 92 90

TOKYO 36 34 60 SHANGHAI 30 28 70 26 ALGIERS 36 60 34 31 JERUSALEM 65 32 70 28 26

SOUTHERN STATES

WESTERN DIVISION

SCALE OF MILES

0 20 40 60 80 100 120 140 160 180 200

NOTE: Railroads appear in red; important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.

Canals — *Head of Navigation* ⚓

VII 06.

NEW ORLEANS AND VICINITY

SCALE OF MILES 0 1 2 3 4 5

E.Y. FARQUHAR, DEL. L.L. POATES, ENGR., N.Y.

IX

Time when Noon at Greenwich 3.28 A.M. 3.44 A.M. 4.00 A.M. 4.16 A.M.

PACIFIC STATES

SCALE OF MILES
0 25 50 75 100 125 150 175 200

NOTE: Railroads appear in red; important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.

Canals *Head of Navigation*

SAN FRANCISCO AND VICINITY

SCALE OF MILES
0 5 10 15 20

CONTINUATION OF THE ALEUTIAN ISLANDS

ALASKA

SCALE OF MILES
0 100 200 300 400 500

E.Y.FARQUHAR, DEL. L.L.POATES, ENGR., N.Y.

120 Longitude West from 116 Greenwich

PLATEAU STATES

Time when Noon at Greenwich 4.08 A.M. 4.24 A.M. 4.40 A.M. 4.56 A.M. 5.12 A.M.

SCALE OF MILES
0 20 40 60 80 100 120 140 160 180 200

VIII 06.

E.V.FARQUHAR, DEL. 118 Longitude West from 114 Greenwich E.L.POATER, ENGR., N.Y.

MEXICO

SCALE OF MILES
0 100 200 300 400 500

NOTE: Railroads appear in red, important Trunk Lines are shown heavier than others. Isotherms appear in brown; Mean Annual Fahrenheit.

MEXICO AND VICINITY
SCALE OF MILES
0 10 20 30

ISTHMUS OF NICARAGUA
SCALE OF MILES
0 25 50

CENTRAL AMERICA AND THE WEST INDIES

SCALE OF MILES
0 100 200 300 400 500

Time when Noon at Greenwich 4.40 A.M. 5.00 A.M. 5.20 A.M. 5.40 A.M. 6.00 A.M. 6.20 A.M. 6.40 A.M. 7.00 A.M. 7.20 A.M. 7.40 A.M. 8.00 A.M.

Longitude West from Greenwich

E.Y. FARQUHAR, DEL. L.L. POATES, ENGR., N.Y.

SUPPLEMENT: INSULAR POSSESSIONS, CUBA, AND PANAMA

PORTO RICO

Physical Features. Porto Rico is the smallest of the four islands of the Greater Antilles. It is about 95 miles long and 35 miles wide, and has over twice the area of Long Island in New York. The mountains extending through the island east and west are little more than a range of hills, the highest peak of which is about half a mile high. From these hills many streams flow into the sea. The small islands of Vieques (vē-ā′kās) and Culebra (kụ-lā′brȧ) to the east, and Mona to the west, belong to Porto Rico.

Government Building, San Juan.

The climate is warm and mild, with little difference in temperature between summer and winter. The rainfall is ample in nearly all parts of the island. The driest month is February; the rainiest is November. The prevailing winds are the northeast trades. Tropical hurricanes are not uncommon.

People. The Indian natives were subdued and destroyed by the Spaniards who settled on the island after its discovery by Columbus in 1493. After four centuries of Spanish rule, Porto Rico was ceded to the United States in 1898. The white inhabitants, mostly of Spanish descent, now number about 600,000, and the negroes about 360,000. Most of the people are uneducated; but schools have been provided for a large part of the children. The Governor is appointed by the President of the United States, but Porto Rico is not organized as a territory.

Industries. Timber is scarce, for the forests have been extensively cleared, and the hills may be cultivated to their very tops. Coffee, sugar cane, and tobacco are the leading products. Upland rice is cultivated on the hillsides, and much native Indian corn is grown. Fruits are produced in great abundance — especially bananas, oranges, pineapples, guavas, and cocoanuts. Some cotton is grown. Large herds of cattle are pastured on the lowlands, and horses of a small breed are also raised. Fowls are abundant.

Commerce. About 200 miles of railroad are in operation, and there are many good wagon roads. The chief exports are sugar and molasses, coffee, tobacco, fruits, and cattle.

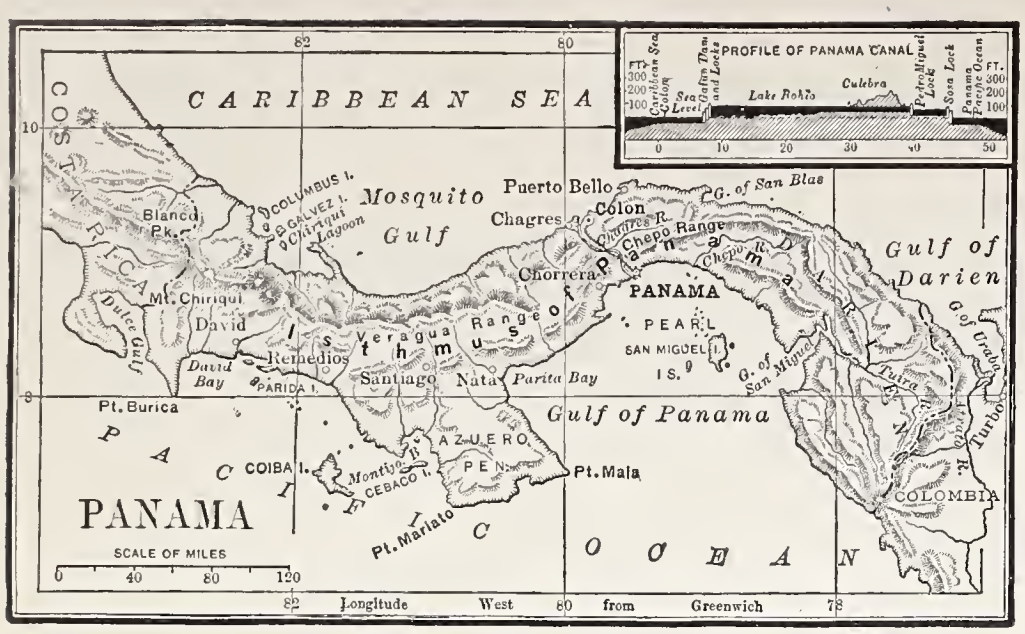
Cities. *San Juan*, the capital, was founded by Ponce de Leon in 1511, on one of the finest harbors in the West Indies. The city is surrounded by a massive wall, and has stately public buildings. The population is about 32,000. *Ponce* (pōn′sā), on the southern coast, is a city nearly as large.

Arecibo (ä-rā-sē′bō), on the northern coast, is an important center and shipping port of the sugar industry.

REPUBLIC OF CUBA

Physical Features. Cuba has a length of 720 miles and an average breadth of 60 miles. Its area is about that of Pennsylvania. In the southeast, the mountains rise higher than the Appalachians; but the central range, as in Porto Rico, is hardly more than a series of hills. From the central mountains fertile meadows and plains slope gently down to the coast. The general course of most of the rivers is either north or south; but the two largest flow westward. Much of the coast is bordered with coral reefs and

The City and Harbor of Havana.



islands. The Isle of Pines, which belongs to Cuba, is nearly half as large as Delaware.

The climate is much like that of Porto Rico. Vegetation is luxuriant, and includes many different kinds of plants.

People. Cuba was discovered by Columbus in 1492, and settled by Spaniards under Velasquez in 1512. The native Indians were enslaved and destroyed. The severity of Spanish rule led to many rebellions, during one of which, in 1898, the United States compelled Spain to withdraw; in 1902 the republic of Cuba was proclaimed, under the protection of the United States. The population includes over 1,000,000 whites and 500,000 blacks.

Industries. Some valuable lumber is cut, copper and iron ore are mined in the southeast, and asphalt is found in the central part of the island. But the great industry of Cuba is agriculture. The chief products are sugar cane and tobacco, for which Cuba is especially noted; but bananas, oranges, pineapples, corn, and sweet potatoes are also extensively produced. Some cattle and poultry are raised.

Inland commerce is aided by about 2000 miles of railroad, but there are few good common roads. The principal exports are sugar and molasses, tobacco, tropical fruits, and cabinet lumber.

Cities. *Havana*, with a population of about 282,000, is the capital, largest city, and chief seaport. It is picturesquely situated on a broad harbor, and has fine public buildings and parks. Havana is a great tobacco market, and manufactures many cigars and cigarettes. *Santiago de Cuba*, in the southeast, is the second city in size and importance. It has a population of about 43,000, and is the center of trade for the neighboring iron and copper mines. *Matan'zas* in the north and *Cienfuegos* (sē-ĕn-fwā'gōs) in the south are important seaports, and *Camaguey* (cȧ-mä'gwā) is the largest inland city.

REPUBLIC OF PANAMA

Physical Features. The republic of Panama is about 500 miles long, but only about 35 miles wide at its narrowest point. It is about as large as the state of Maine. It is traversed by a low mountain range, but in the west there are volcanic peaks about two miles high.

The climate is tropical, with an excessive rainfall. The northern coast is damp, hot, and unhealthful; but the highlands and most of the south coast have a more healthful climate.

Resources. Dense forests, containing valuable timber and dyewoods, cover most of the country. The soil, where cultivated, is very fertile. Gold, copper, iron, and other minerals are found.

People. For many years Panama was part of Colombia, but in 1903 it declared itself an independent republic.

The people number about 228,000, mostly of mixed Spanish, Indian, and negro origin. Many are engaged in agriculture and herding; but the chief industries are those centered about the partly constructed interoceanic canal, and in the railroad which crosses the isthmus. *Panama*, the chief city, with a population of 30,000, and *Colon* are the important seaports at the ends of both the railway and the canal.

The Panama Canal. The route of the canal crosses the isthmus at its lowest point, and is nearly 50 miles long. The first attempt to cut a canal there was made in 1878, by a French company, which failed after spending much money and doing only a small part of the work. In 1904 the unfinished work was sold to the United States, which is now constructing the canal. The proposed canal is to have six locks, with a summit level 85 feet above the sea. The width is to be 200 feet at bottom; depth, 45 feet.

Dense Tropical Growths, Hawaii.

Canal Zone. By a treaty made in 1903, the republic of Panama granted to the United States the perpetual use and control of a strip of territory known as the Canal Zone. This grant extends five miles on each side of the center line of the canal route and entirely across the isthmus, but does not include the cities of Panama and Colon.

TERRITORY OF HAWAII

Physical Features. The Territory of Hawaii comprises the Hawaiian Islands, which lie in the Pacific Ocean about 2500 miles southwest of San Francisco, in about the same latitude as Cuba. Their area is less than that of New Jersey. The largest island, Hawaii, is smaller than Connecticut. Each island was originally built up of lava outflows, and several volcanoes in the island of Hawaii are

Loading Sugar Cane on Cars.

still active. The greatest elevations are more than twice as high as any in the Appalachian Mountains. The surface is mountainous and much of it is very rough and uneven. The islands are fringed with coral reefs.

The climate is warm and very pleasant. The temperature is made equable by the vast surrounding ocean. The prevailing winds are from the northeast. The windward slopes receive much rain, but the leeward slope of Hawaii is rather dry.

Vegetation and Animals. The windward slopes are covered with a dense tropical growth, and the forests contain much valuable timber. Among the useful native trees and plants are the cocoanut, breadfruit, banana, and the wonderfully nutritive taro.

There are few kinds of native animals, besides birds. Pigs, dogs, and rats were introduced by man centuries ago. Recently imported goats and cattle have increased into wild herds.

Harbor of Honolulu.

People. Since Captain Cook discovered the islands in 1778, the natives have decreased from perhaps 300,000 to less than 40,000 in number; but the population now includes also more than 60,000 Japanese, about 25,000 Chinese, and nearly 30,000 whites. The natives were quickly educated and civilized by American missionaries in 1820 and later. Children of all races are now obliged to attend school. The islands were governed by native chiefs and monarchs till 1893; then the queen was deposed and a republic set up, which in 1898 was annexed to the United States, and two years later was organized as a territory.

Industries. The cultivation of sugar cane is by far the most important industry. The bulk of the sugar is shipped in its raw state to San Francisco, where it is refined. Coffee, which grows on the elevated lands, is also exported. Some rice is raised by the Chinese. The common garden vegetables, taro, and oranges, pineapples, bananas, and many other fruits produce abundantly. There are large sheep farms, and wild cattle are killed for their hides. Many fish are caught along the coast.

Nearly all the sea-borne commerce of the territory is with the main part of the United States.

Cities. *Honolulu*, the capital, has a population of about 39,000, and is a port of call for many vessels crossing the Pacific. The harbor is more than a mile long, and admits the largest ships. The city contains substantial government buildings and ship yards, iron works, planing mills, rice mills, and ice factories. *Hilo* (hē′lō), with about 20,000 inhabitants, has a beautiful situation on the island of Hawaii, and is next to Honolulu in importance.

THE PHILIPPINE ISLANDS

Physical Features. The Philippine Islands are about 600 miles southeast of China, in about the same latitude as Central America. Luzon and Mindanao (mēn-dä-nä′ō) are each larger than Indiana; together they include more than half the area of the whole group. The surface is much broken by mountain ranges and volcanoes. Several of the islands have peaks higher than any in the Appalachians. There are many water courses, the largest rivers being the Cagayan (cä-gä-yän′) in Luzon and the Agusan (ä-gu̇′sän) in Mindanao.

The climate varies considerably in different parts of the archipelago. In most of the lowlands it is tropical, with three seasons: the temperate, with an average temperature of about 78°, from November to February; the hot, from April to June, in which temperatures of 100° are occasionally reached; and the wet, from June to October, during which torrents of rain fall. Violent hurricanes, or typhoons, visit the northern islands.

Mayon Volcano, Luzon.

The Forests are of wide extent and contain many valuable kinds of timber — cedar, teak, dyewoods, ebony, and other beautiful cabinet woods. The forests also supply various resins, rubber, gutta percha, and other gums. The cocoanut palm flourishes everywhere, and bamboo, rattan, mangoes, and all Malayan fruits grow in abundance.

The Wild Animals include the monkey, deer, wild cat, alligator, turtle, python, and smaller snakes, of which only one kind is poisonous. Of birds there are several hundred species, and there are numerous beautiful butterflies and destructive ants.

A Street in Manila.

People. The Philippines were discovered by Magellan in 1521, and for nearly 400 years these islands were subject to Spain. After the Spanish-American war of 1898 they were ceded to the United States. For some years they were governed by appointed officers; but the natives have now been given some share in the government.

The people number about 7,650,000, mostly of Malay descent. About nine tenths of them are civilized Christians, including the Tagals (tä-gälz′) of Luzon, the Visayans (vē-sä′yänz) occupying several islands south of Luzon, and other peoples. In the far south are the Moros, who are Mohammedans. There are also many small wild tribes inhabiting different islands; a few woolly-haired Negritos, descended from the original inhabitants; and over 40,000 Chinese.

A Philippine Hemp Field.

Agriculture is the prevailing pursuit. Though rice is perhaps the chief crop, the entire product is used for food in the Philippines, and more is imported. Manila hemp, sugar cane, copra, and tobacco are produced and largely exported. Cacao and Indian corn (introduced from America), with bananas, vegetables, pineapple fiber, cotton, and pepper, are other products of importance.

The wild buffalo, or carabao, is domesticated, and is the beast of all work. Small horses, cattle, hogs, and poultry are also raised.

Manufacturing by machinery is not largely developed. The women weave by hand many beautiful textiles. Many cigars and cigarettes are manufactured, and carriages, furniture, pottery, hats, and metal work are produced for home use.

Commerce within the islands has suffered from the want of roads, and there are only about 200 miles of railroads — all in Luzon. Foreign commerce centers in the main ports where products are gathered for export.

Cities. *Manila*, the capital, is a city of 220,000 inhabitants, situated on a large bay of the same name. It is the main port for foreign commerce. Telegraph cables connect it with Hongkong and San Francisco. *Iloilo* (ē-lō-ē′lō) is the second city in importance, and has a large trade in sugar. *Cebu* is a well-built city and an important trade center. These cities are near the central part of the archipelago. *Laoag* (lou-äg′) in the far north, and Zamboanga (thäm-bo-än′ga) in the south, are also places of importance.

View on Pago Pago Harbor, Tutuila.

GUAM, ceded to the United States by Spain in 1898, is the largest and most populous of the Ladrones (la-drōnz′), a group of islands east of the Philippines. The people are partly descendants of immigrants from the Philippines. Guam is important only as a naval and coaling station, and cable landing.

TUTUILA AND MANUA ISLANDS are the eastern portion of the Samoa group, in the south Pacific Ocean, and were ceded to the United States in 1899. The natives resemble the Hawaiian natives, and are noted for their strength, bravery, and intelligence. The excellent harbor of Pago Pago is occupied as a naval and coaling station.

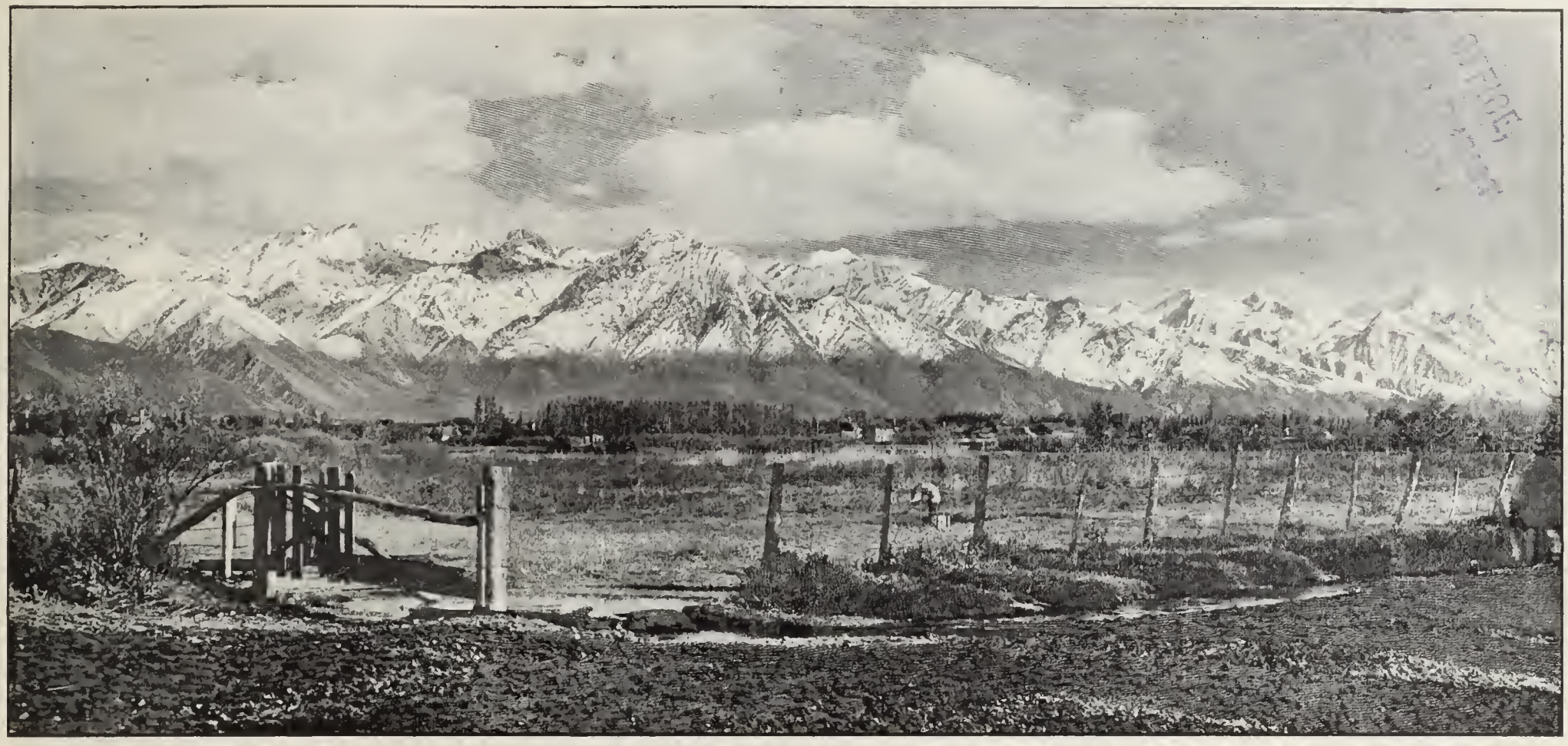
The United States also owns in the Pacific a number of islets with insignificant area — among them Midway and Wake.

MIDWAY ISLAND is an atoll in the middle of the north Pacific Ocean, and was occupied by the United States in 1867. Some money has been spent in improving the harbor there; but the chief importance of Midway is as a cable landing.

WAKE ISLAND is an atoll in the north Pacific Ocean, halfway between the Philippines and the Hawaiian Islands. It has no inhabitants, and was seized by the United States in 1899.

GEOGRAPHY OF UTAH

By J. H. Paul, Ph.D.
Professor of Nature Study in the University of Utah



Wasatch Mountains, Salt Lake Valley.

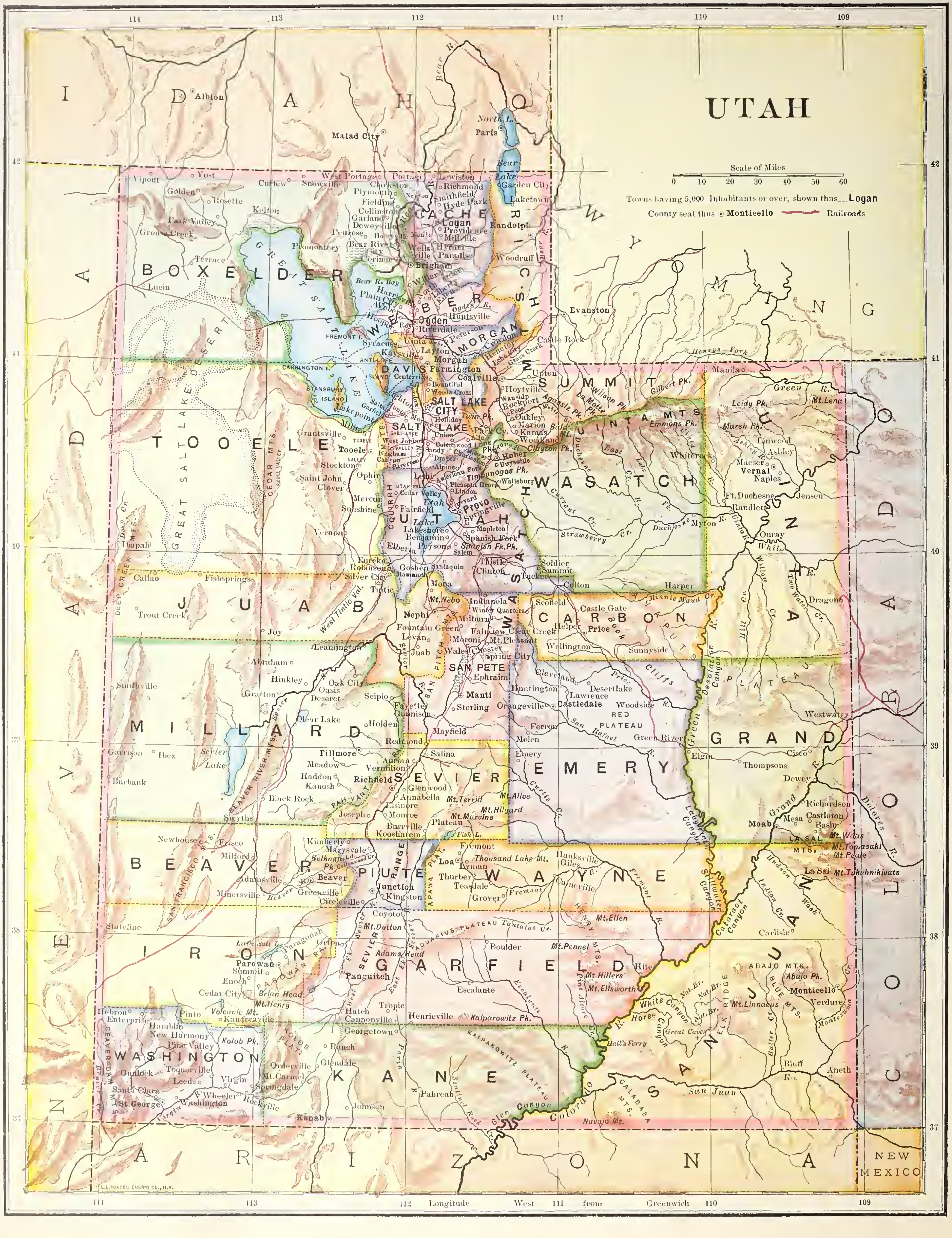
Surface. — A Rocky Mountain eagle, soaring above the hilltops and over the valleys of this state, would perceive that Utah consists of three great surface areas, each variously broken up into minor differences of detail. First, there is the mountain and valley region of the Wasatch and Uinta mountain ranges which meet almost at right angles in the most populous portion of the State; second, the lake, basin, and desert region, — a saucer-shaped depression extending westward across Nevada, thinly settled, but containing rich mines and a rapidly increasing population; third, a high table-land or plateau, south of the Uintas and east of the Wasatch, still more sparsely settled, but full of promise on account of its fertile areas, its precious metals, its coal, hydrocarbons, and mineral oil.

The General Aspect. — Our first impressions of Utah are that it is ill suited to the arts and industries of man; it seems interesting chiefly as a wonderland; for here nature has played strange freaks, as if to excite the curiosity of the student.

The barrenness, the solitude, the silence, the desolation of desert plains, the solemnity of gray sagebrush hills, the majestic grandeur of the higher mountains, the clearness and brightness of the sky by day, the brilliance of the stars at night, the freshness of the atmosphere, which breathed hope even as it imparted health to the weary little band whose plows (July 24, 1847) were busy within an hour after their arrival in Salt Lake Valley, — these were the aspects of the semi-arid regions that most impressed the pioneers, that have never failed to interest the tourist, and that first concern the student of geography.

The air is dry, because Utah is far from the ocean and surrounded by lofty mountains; it is thin or light, because the lowest parts of the land surface are higher than the tops of the Appalachians; it is clear, because the air is generally dry; and, except in a few cities, the sky is free from smoke, although the haze of Indian summer and an occasional dust storm occur in August, September, and October.

The Mountains. — The transparency of the air causes even distant objects to stand out clear to the sight; and no sooner have we gained the tops of the Wasatch Mountains than a panorama of endless variety expands before our eyes for 100 miles or more on every side; a succession of peaks, ridges, plateaus, hills, hollows, cliffs, canyons, and slopes of all angles — a series of pictures that must be seen in order to be appreciated. The Wasatch range, on which we stand, curving west as it stretches from north to south through the state, has lifted itself 7000 to nearly 12,000 feet above the sea. Some of the elevations are massive and picturesque, others rolling hills that sink into valleys and canyons threaded at the bottom by shining silver lines, — rivers. The streams cut east or west across this vast succession of highlands. Most of the canyons are deeply scored by ancient glaciers. Those with streams are being slowly cut still deeper. Let us go on still higher to the tops of the mighty Uintas. Here we behold a grander picture, — a surface still more rugged, the peaks even higher (over 13,000 feet), the river beds still deeper. Evidently the mountains themselves could not at first be settled.



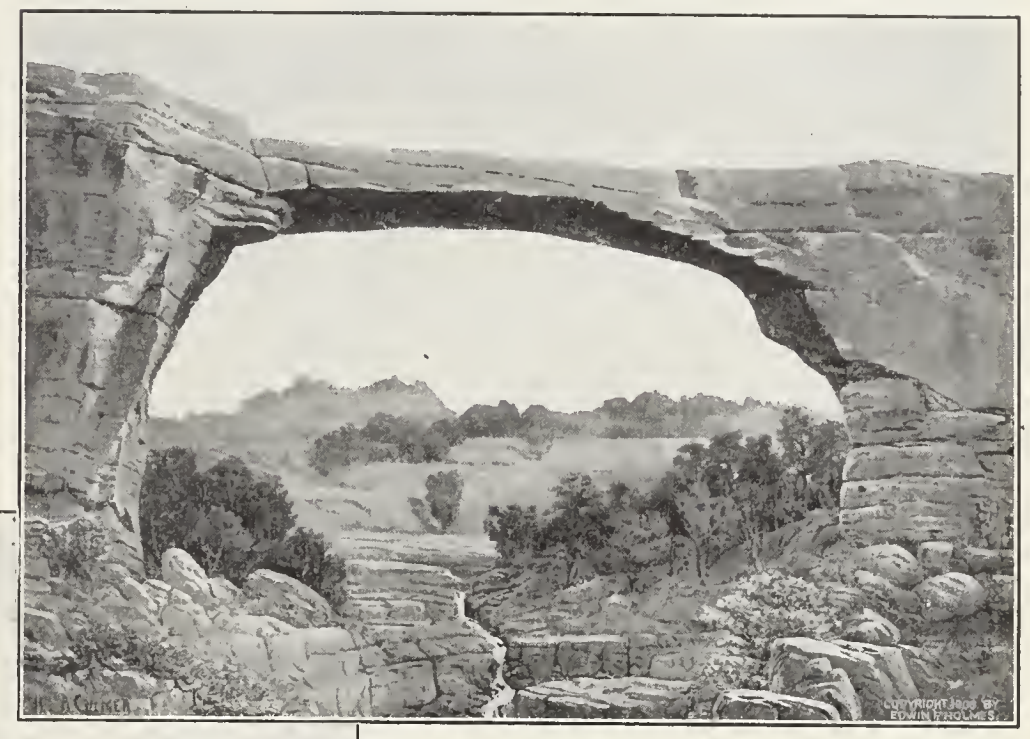
UTAH
Scale of Miles
0 10 20 30 40 50 60
Towns having 5,000 Inhabitants or over, shown thus... Logan
County seat thus ⊙ Monticello
Railroads
IDAHO
WYOMING
NEVADA
COLORADO
ARIZONA
NEW MEXICO
BOXELDER
CACHE
RICH
WEBER
MORGAN
DAVIS
SUMMIT
SALT LAKE
TOOELE
WASATCH
UTAH
JUAB
UINTAH
CARBON
SAN PETE
MILLARD
EMERY
GRAND
SEVIER
BEAVER
PIUTE
WAYNE
IRON
GARFIELD
SAN JUAN
WASHINGTON
KANE
GREAT SALT LAKE
GREAT SALT LAKE DESERT
UINTA MTS.
Salt Lake City
Ogden
Logan
Provo
Longitude West from Greenwich
L. L. POATES ENGR'G CO., N.Y.

Deserts and Salt Lakes. — West of the Wasatch lies the glittering surface of the Great Salt Lake. There is no vegetation about its shores. Farther out we see only greasewood, which indicates a soil that it does not even now pay to reclaim; rabbit brush, indicative of clay and sand, and perhaps some alkali; and saltbushes, which grow where other vegetation perishes because of the alkali in the soil. No rivers are to be seen here and only a few springs, but the region has many salt lakes or "sinks," and a barren, stony, or sandy soil where the hot wind raises whirls of dust on every summer day. Here are occasional flats coated with alkali in summer, on which, alone of all the desert lands, absolutely no vegetation grows. In their soft mud in winter, horses and wagons are hopelessly mired. Nothing of use can be found except sagebrush for firewood, and saltbushes, the value of which in taking alkali from the soil, has only just been learned. The western third of Utah was deemed uninhabitable by the first settlers.

Southeastern Plateau. — A Mormon colony of 90 men, 28 women, and 56 children, called on a "mission" to found a city in San Juan county, made their way in 1879 to the Colorado River. It required three months at what is now known as Halls Ferry, to cross and ascend the opposite cliffs, a distance in all of only five miles. The guides of the party, the first white men to penetrate this wilderness, had narrow escapes from perishing by hunger and accident; and the sufferings of these forgotten pioneers have never been told in print. But their journey revealed certain oases in the river valleys and elsewhere; also America's newest, strangest, grandest wonderland.

Temple of Om — a Result of Surface Erosion, San Juan County.
From painting by H. L. A. Culmer.

The scenery becomes more grand and fantastic, the canyons become deeper, the cultivable valleys fewer, the farther southeast we go, till perpendicular cliffs, high pinnacles, and rugged towers of pinkish sandstone mark much of the country. The strata are not folded, but simply upturned or tilted. Many of the plateaus are capped with lava or sandstone, which has protected the underlying strata from erosion which in other places has carved deep, often impassable "box canyons," irregular, strange, and indescribable. Notice the names, — Desolation, Labyrinth, and Stillwater canyons along the lower course of the Green River, Cataract Canyon at the junction of the Green and Grand rivers with the Colorado, and Glen Canyon, 2000 to 3000 feet deep, between the mouth of the San Juan and the southern boundary of the state, whose vast cliffs and gorges resemble, yet do not rival, the still more magnificent scenery of the Marble and the Grand Canyon of the Colorado in northern Arizona.



Edwin Natural Bridge — a Result of Erosion, White Canyon.

Ogden Canyon.

A New Wonderland. — The plateau is wooded in some places, in others covered with desert sands; it has areas bright with many flowers in spring, but dust-covered in the arid, rainless summer; and it contains pitfalls in the form of caverns that yawn from unknown depths.

From cliff to cliff over the White Canyon extends an arch so magnificent and shapely as to rank among the most splendid achievements of nature — the Augusta natural bridge, the largest rock formation of this kind in the world. On each side are walls so gigantic that the large cottonwoods at the base and the huge pines around the abutments seem like mere shrubbery; while the dashing stream beneath dwindles to a rivulet when viewed from the colossal arch. The first men to reach the top of this bridge were members of the Culmer party in April, 1904. They measured the height — 265 feet — (others say 165 feet) from the stream to the causeway, which is 83 feet

Ruins of Ancient Cliff Dwellings, San Juan County.
From photograph by Byron Cummings.

thick, 35 feet wide, and has a span of 320 feet. Caroline bridge, with a span of 350 feet, is similarly huge, but clumsy; 182 feet to the top and 60 feet wide at the narrowest point. Edwin bridge arches across 205 feet, is 111 feet high, 10 feet thick, and 30 feet broad.

Cliff Dwellers. — Simple-looking hieroglyphics cover the walls of White and other canyons, while structures built by the cliff dwellers nestle among the ledges. Their houses were made in a remote antiquity, said to date back to the glacial period. They were a flat-skulled but somewhat intelligent people, and were preceded by the cave dwellers, a more primitive race with narrow skulls. The latter race lived ages before metals were used — before even bows and arrows were known. Their axes were of stone, to which wood handles were bound with yucca fibers. Spearheads used by them, sandals, linen cloths, feathered funeral robes, bone implements and needles, have been found, but no articles of copper or bronze. The cliff houses are fragile shells always near arable ground. Corncobs and pumpkin seeds have been found in them. Probably some of these houses were used only as storehouses, others as burial places, others as temples or forts. The people seem to have lived on the fertile plains.

Southeastern Utah, much drier now than in the days of the cliff dwellers, was likewise hopeless for human habitation until the railroad had crossed this section, the coal had been discovered, and fertile oases had been found out. Now its day is also dawning, and sounds of human industry have once more broken the silence of this remarkable desert.

Does the following description seem to apply to your valley?

"There is a touch of Switzerland in the rapidly rising, pointed peaks of the Wasatch, and a glimpse of Italy in the fertile valleys at their feet." The blue of the skies, the tints of the sunsets, especially over the lake, painters declare to be among the most beautiful to be seen in the world. Describe a colored sunset in your valley.

Local Work. — What rivers cut through the Wasatch range and flow into Great Salt Lake? Utah Lake? What river almost encircles Bear Lake? What river in southern Utah takes a similar course? What lakes does it encircle? What receives its waters? What is a divide or watershed (§ 45)*? Draw a line on the map to show the watershed between the rivers that flow north into Sevier Lake and those that flow south into the Colorado. Make a line between the rivers that flow east or southeast into Green River and those that flow into the Great Salt Lake and Utah Lake; between those that flow into the Colorado and into Green River. What is a drainage system (§ 44)? How many drainage systems has Utah? In which section of the United States is Utah (map page 55)? Name the other sections (p. 55). Answer the questions on the Plateau section (p. 79). Describe the Rocky Mountain highlands (p. 45). Have you seen or heard of any lands in Utah resembling the "Bad Lands" (p. 45) of South Dakota? Have you seen any of the old lake terraces (p. 46)? Describe from page 46 the surface of the plateau region; the Great Basin; the origin of our lakes; the lava flows.

Of what is "the ground" around your school building mainly composed. — of rock, gravel, sand, clay, or black soil? Is the land flat? or sloping to what stream? How deep is the soil? Is it fertile or barren? Why? How proved? From what mountains has this soil been washed down?

Find on the map of Utah the highest peaks of the Wasatch, which are Twin Peaks (11,563 feet), Lone Peak (11,295), and Clayton Peak (11,889), all east of Salt Lake Valley; Mount Nebo (11,887), in Juab county; Timpanogos Peak (11,957), facing Utah Valley from the east; and Spanish Fork Peak (9970). The Wasatch range proper ends in the vicinity of Mt. Nebo; the heights farther south belong to another system and form part of the Colorado plateau.

Among the important peaks in southern Utah are Mount Terrell (11,600 feet), Mount Manning (11,600), Mount Ellen, (11,485), Mount Hilgard (11,460), Mount Pennel (11,320), and Thousand Lake Mountain (11,240). West of the Sevier River are Belknap Peak (12,200 feet) and Brian Head (11,600). East of the Grand River are Mount Peale (13,089 feet), Mount Waas (12,319), Mount Tomasaki (12,270), and Mount Tukuhnikivats (12,004).

The principal peaks of the Uintas are Emmons Peak (13,624 feet), Mount Agassiz (12,450), Bald Mountain (11,970), Leidy (12,250), Lena (9,500), La-Motte (12,750), Gilbert (13,687), Wilson (13,300). Marsh (12,410). At its western end the Uinta range grades into a plateau of 8,000 feet mean elevation,

Castle Gate, Carbon County.

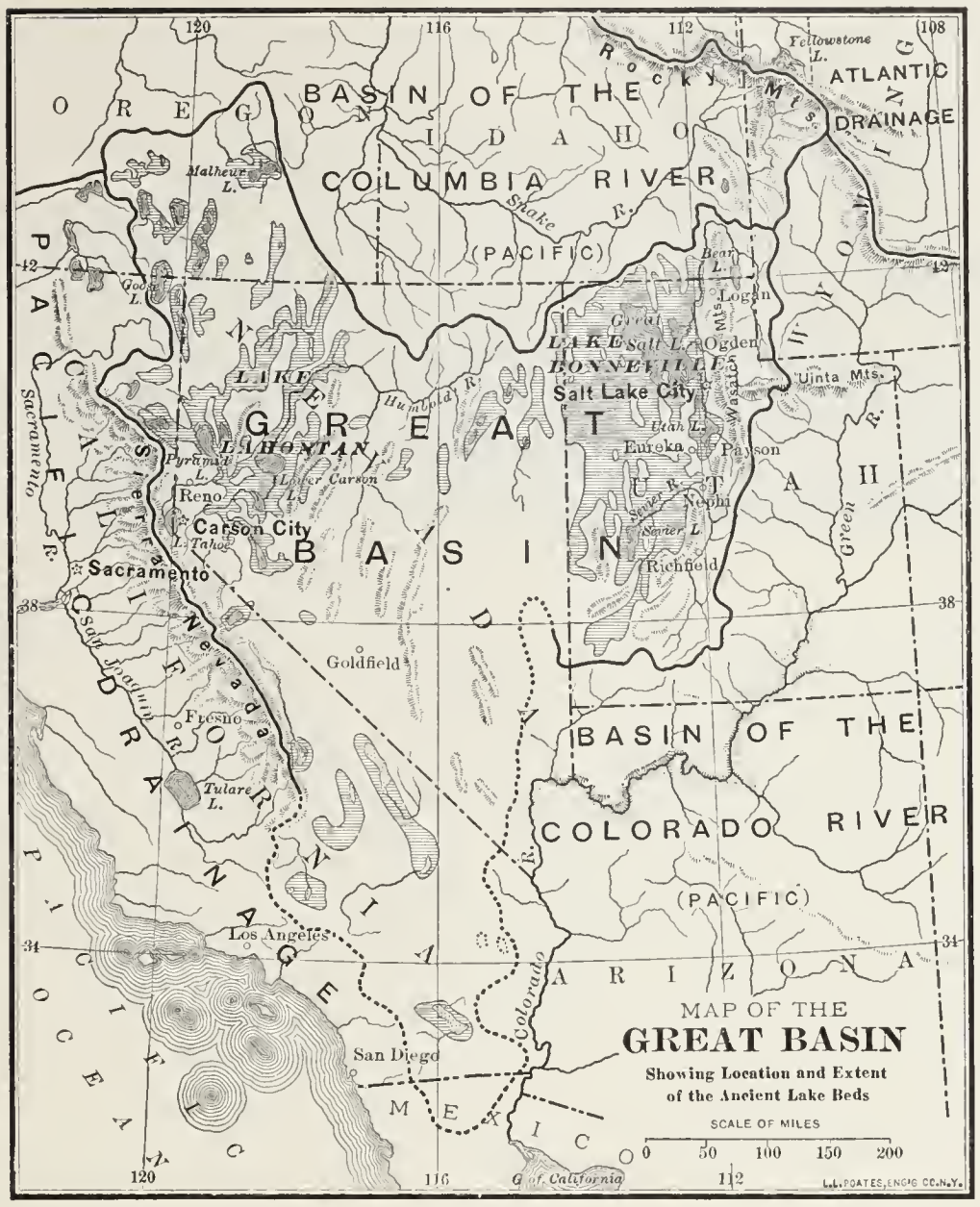
and abuts directly against the Wasatch, which crosses its course virtually at right angles.

The Henry mountains consist of a volcanic rock called trachyte, which, as molten lava in a bygone period welled up from below and arched the stratified rock above it into huge domes. Later the surface layers of these domes were worn away by erosion, exposing the igneous (fire-formed) mass of rock that had come from the heated interior. These arched lava flows are called laccolites (stone cisterns). (See §§ 30, 31, 32, 33.)

Mystery of the Desert — Sandstone Monoliths of Southeastern Utah, produced by the Erosion of Surrounding Surface.
From painting by H. L. A. Culmer.

* The numbers refer to sections and pages in the Natural School Geography.

The Inland Lakes.— *The Great Salt Lake* is America's dead sea. Its strange story is partly shrouded in mystery. It is seven times larger and contains more common salt though somewhat less solid matter dissolved in its waters than Palestine's Dead Sea, whose waters roll over the sites of ancient Sodom and Gomorrah. Like that famous sea, this lake receives the waters of a "Sea of Galilee"—Utah Lake—through the river Jordan. The two land areas containing these bodies of salt water are strikingly similar. Salt Lake lies in a mere corner of the basin, yet it covers 2700 square miles. It is in a depression, yet is 4200 feet above the ocean. While the Atlantic, with $3\frac{1}{2}$ per cent of solid matter, is said to be salty, the lake water averages nearly 20 per cent of solid matter in solution. Over 8,000,000,000 tons of salt and 784,000,000 tons of sulphides of soda are dissolved in its clear, sparkling brine.



Ocean waters teem with large and varied as well as with minute forms of life; but the lake contains no fish or larger species of animal life and only three minute forms of living things. Tiny brine shrimps, needle-like, and about one quarter of an inch long, are numerous in summer; and a small fly that lives upon the surface and feeds upon minute, yellowish globules (sea weeds), in the water, is common. Its larva preys upon the brine shrimps. Sea gulls, abundant on its waters, hatch their young in shallow nests in the sands, and with pelicans and cranes make of some of the islands perfect rookeries, where the birds congregate in thousands. It is an odd experience to go among their nests in summer. The young gulls, resembling fluffy balls of white and yellow down, run about so thick that it is difficult to avoid stepping on them, while the parent birds circle above your head in great numbers, filling the air with their warning cries.

The lake is shallow, with an average depth of 13 feet. The thirsty atmosphere evaporates from its surface a depth of water of from 5 to 7 feet annually, as compared with less than 2 feet evaporated from the surface of Lake Michigan. The water was very low in 1850, but rose to its highest level in 1873. Then it sank, till about 1905 it reached its lowest point. Since that time it has been rising again. These changes show what would happen if the climate became much more moist than it is now. The water would become fresher, for in 1850 it contained 22 per cent of solid matter; in 1873, 13 per cent; and in 1901, 25 per cent. If the climate continued moist for ages, the lake would nearly fill the eastern part of the Basin. Indeed, nearly the whole of the Great Basin was once occupied by two inland seas, separated by the mountains near its center. Into these inland seas, the rivers and floods carried vast quantities of earth, forming deltas now left high and dry in the form of benches near Logan, Ogden, Salt Lake City, American Fork, Provo, and Spanish Fork. Once the climate was cold and snow piled up in the mountains till it filled the canyons and slowly flowed into the water as rivers of ice, or glaciers. Each ice stream acted like a great plow, which cut out its channel by wearing into the rock of the canyon bed, carrying the ground-up rock-powder into the valley. The marks of ancient ice plows are still to be seen in many of the canyons. How long the ice age continued we do not know. One of the lakes must have been fresh water after it had found an outlet, but when the climate grew warm and dry, this fresh-water sea shrank to a smaller salty lake.

Lake Bonneville. — Have you ever seen, on the western slopes of the Wasatch Mountains, any of the long parallel lines rising like steps from the bench land upon the mountain side? (p. 46.) They were made by water—by the waves of a lake that must have washed a shore line just where each terrace now is. Then the water must have risen or fallen in level so rapidly for a time that no new terrace was formed. Then, standing at another level for many years, its surface waves would again cut into the mountain, making another terrace. How, then, can we say just how large this lake was? Since these terraces are found on the Basin ranges also, how far must the original lake have extended? In fact, it filled much of western Utah, covering 18,000 square miles and must have been about 1200 feet deep. So cool and moist was the climate in the ice age that another lake spread over much of Nevada. Finally the Utah lake ran over the Great Basin's edge at the north. The present Portneuf, Snake, and Columbia rivers carried the waters to the Pacific till the basin was drained to the Provo beach level and was partly filled with soil from the mountains. All that was left of the vast lake was the Salt Lake and smaller bodies of water. Those that had no outlet became salt, because the minerals did not evaporate with the water, but kept increasing. Boil away a bucketful of ordinary water till only a pint remains, and it will be salty. This explains the origin of salt in lakes that have no outlet. The more easterly of these great ancient lakes has been named Lake Bonneville; the one that covered part of Nevada is called Lake Lahontan.

BRINE SHRIMP.
Magnified 8 diameters.

The Other Lakes. — *Utah Lake* (27 × 12 miles), the only important body of fresh water within the state west of the Wasatch, lies at an altitude of 4500 feet above sea level. During the irrigation season most of the tributary streams are diverted at higher levels and but little water reaches the lake. A large canal runs from the north end of the lake into Salt Lake county. The elevation of the lake gives to it great value as a natural reservoir.

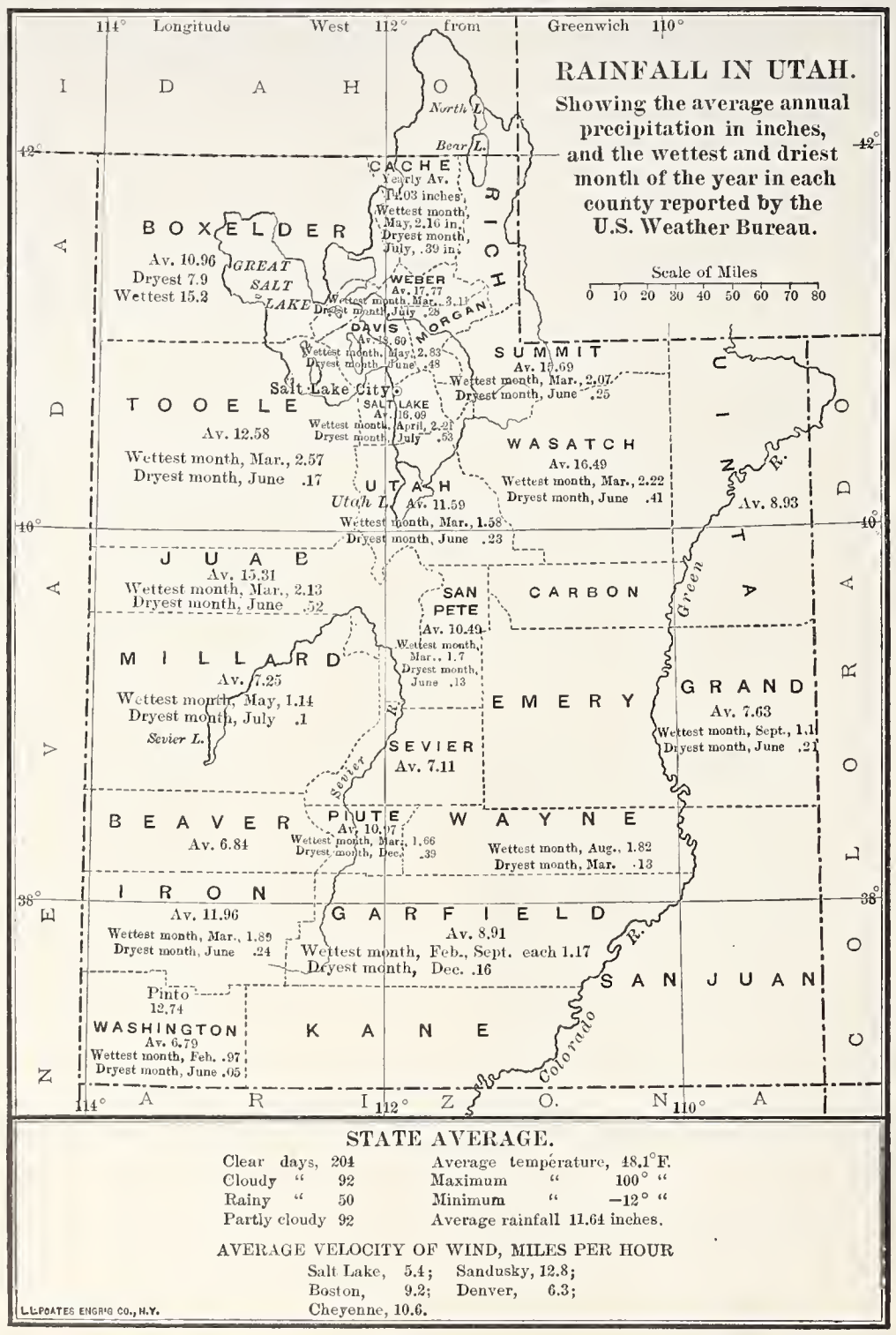
The yearly evaporation from the 93,000 acres of its surface is estimated by engineers at four feet — half the average depth of the lake. Parts of the shores are marshy, filled with rank vegetation, the breeding ground of disease. Dikes are to be built on the south, east, and north shores, cutting off these marshy arms, reducing the water surface by 14,000 acres, and saving each year 30 billion gallons of water now lost by evaporation. Engineers estimate that by dredging and diking, 25,000 acres of land will be gained. The 45,000 acres irrigated from the lake now get only half enough water. This plan will double their water. The value of this increase and of the marsh land reclaimed, the state engineer estimates at seven and a half million dollars. The cost of making Utah Lake into a reservoir will be one million dollars.

Bear Lake (8 × 20 miles), which has its southern half in Utah, its northern in Idaho, is a body of fresh water lying at an altitude of 5900 feet, its blue surface making an exquisite picture seen from the towering mountains amid which the lake lies. Its overflow is into Bear River. The lake is well stocked with fish. Fish Lake, on a high plateau of the same name, occupies the crater of an extinct volcano. It is the source of the Fremont River, and is an excellent fish preserve.

Sevier Lake occupies a depression near the central part of Millard County. Its waters are intensely saline, its dimensions variable. In wet periods it covers an area of from 150 to 190 square miles, while in more arid times it practically dries away.

Local Work. — Trace the course of the following rivers: (*a*) flowing into Great Salt Lake: Bear, Weber, and Ogden, (creeks not shown: City, Parley's, Emigration. Mill, Big and Little Cottonwood), Jordan; (*b*) into Utah Lake: Provo (American Fork, Hobble Creek, and Spanish Fork not shown); into Sevier Lake: Sevier (and Sanpitch); into the Colorado: Henry's Fork, Duchesne (and Strawberry), Minnie Maud, San Rafael, Fremont (and Curtis), Pine Alcove, Escalante, Sentinel Rock, Paria, Virgin. How do you know that Fish Lake is fresh water? What mountain lakes in your county? desert lakes?

Did you ever bathe in Great Salt Lake? Why can't you sink in it? Weigh like quantities of fresh and of very salty water; account for the difference in weight. The lake water stands most of the summer at 80 degrees. Have you ever heard of people bathing in sea water so warm? In tropical seas the water is sometimes 80 to 83 degrees. Does the water get either so warm or so cold as the air? Give reasons. What other Utah lakes are salty? Why? Which are fresh? Why?



STATE AVERAGE.

Clear days,	204	Average temperature,	48.1°F.
Cloudy "	92	Maximum "	100° "
Rainy "	50	Minimum "	−12° "
Partly cloudy	92	Average rainfall	11.64 inches.

AVERAGE VELOCITY OF WIND, MILES PER HOUR

Salt Lake, 5.4; Sandusky, 12.8; Boston, 9.2; Denver, 6.3; Cheyenne, 10.6.

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Climate. — "Here the climate is so delicate, the air so balmy, that it is a pleasure to breathe, by day and by night."—Record of Father Escalante, a Spanish priest, encamped at the mouth of Provo River, July 4, 1776. From October to March, the air is so dry that each cubic foot has only one grain of vapor; from April to September, it has three grains. When air is saturated, its moisture content is said to be 100; Salt Lake air contains but 50.8; that of Denver, 55; Los Angeles, 60.7; Omaha, 70.7; and Jacksonville, Fla., 77. Calmness is another characteristic of the valleys; for the wind velocity averages but 5.4 miles per hour — a gentle breeze. The highest temperature in most of the state rarely goes to 100 degrees; the lowest rarely to − 3 degrees. Changes are gradual and almost imperceptible. Probably there is no other region so high and so dry where the daily change from warmth to coolness is so small. In some parts of the East a change of 40 degrees may occur in an hour; here only in several days. Our coolness comes at night when, on account of being indoors, we feel it less. In midsummer, the plains and valleys have no dew; the nights are as dry as the days. The sun shines from September to Christmas. The rainy season is late winter and early spring, though occasional refreshing showers fall in summer and autumn.

At an elevation of 6000 feet the air contains 25 per cent less oxygen than at sea level; the body is relieved of 7000 pounds of air pressure; the pulse quickens ten beats per minute; breathing is faster and deeper, enlarging the chest; evaporation from the lungs and the skin is increased. Since each pound of evaporated moisture removes 1000 degrees of heat, and since evaporation goes on much faster in dry than in moist air, heat is not felt here as in moist countries, where evaporation is slow. It is moisture, too, that makes the winter air "raw" and biting. Winter here is often so dry that the cold is not much noticed. Residence in this dry atmosphere usually cures asthma, bronchitis, and hay fever.

Local Work. — The table which appears on the following page shows that the four seasons are distinctly marked. The varied changes "when spring is beautiful, when summer shines, when autumn's hue hath tinged the golden vines, and when the snow stars glisten," are all enjoyed in Utah. Hail and thunderstorms are neither common nor destructive. Winds rarely do much damage.

What is the average rainfall in your district? (See tables and weather map.) Is it enough for dry farming? Which is your wettest month? your driest? coldest? warmest? When do the ponds freeze? When was the first frost last fall? the first snow? When did the latest frost occur last spring? the latest snow? What crops were injured? Which is the warmest hour of your day? the coldest? How do you find out? What winds (N.—E. S.—W.) usually precede your rains? your snows? Describe your last storm;

your south wind; your west, east, and north winds. How deep does snow fall in your district? How long does it lie? How deep does ice freeze on your ponds? In what particular does your climate vary from the following account of it?

"There is no other climate like it. It is not warm, not cold, not damp, not dry — just a happy medium between the extremes, with a breath of the salt sea air thrown in; enough rain to help the farmer, enough snow to store up water for irrigation, enough cold now and then to spread out sheets of ice for skating boys and girls, enough heat to make a dip in the lake one of the joys of living. St. George has an ideal winter climate; the elevation is low, the air is dry, snow and rain are seldom seen, and flowers bloom there in January." — COLBURN.

BATHING AT SALTAIR, GREAT SALT LAKE.

State from your last season's experience, how far the following is true of your climate: —

"We have no cyclones, blizzards, sand storms, tornadoes, earthquakes. The velocity of the wind is less in winter than in summer. In autumn the climate of Utah is simply unapproachable in all the qualities that make weather delightful — clear, sparkling, and bracing." — CULMER.

In spring and fall, rain is preceded by south and southwest winds, the barometer falls, but begins to rise just before the storm. In summer, northwest winds and falling barometer precede rain about 24 hours. In summer, low pressure (light air) over the northern Rocky Mountain slope, and high over the Pacific northwest, indicates a storm. In other seasons low pressure over the Washington coast, or forming over the plateau region, indicates a storm. From April to September, cirro-stratus clouds precede rain two or three days, and from October to March one to two days. Cirro-cumulus clouds also may precede storms.

Study the above and try to predict the next storm. The Weather Bureau at Salt Lake City will send the daily weather map and forecast to any school that will write for it.

A cyclone is a large whirlwind (p. 21). All our large storms are parts of a cyclone (pp. 47 and 48) from northwest to southwest and passing eastward.

Describe the largest whirlwind you ever saw. How long did it last? Where did it begin? At what time of day? The small whirls in the daytime in our dry places never develop into the "sand spouts" or the immense dust storms common in the far East.

The Indians. — The Indians of Utah belonged to the Shoshone family, and the different tribes spoke languages more or less related. The dominant tribe were the Utes, with communities on the Weber and the Uinta River. The Yampa Utes were south of the Uintas. In the southeast were the Fish Utes, the Elk Mountain Utes, and the Sheberetches. In the southwest the principal tribes were the Pah Vants and the San Pitches. South and west of the Great Salt Lake were several colonies of Goshutes, whose language was closer to Shoshone tribes than to those of the Utes proper. The Goships of Salt Lake Valley were close to the Goshutes. The Piutes and Piedes centering in Nevada, ranged into Utah, as did also the Bannocks, centering in Idaho. The two main languages were the Ute and its dialects and the Shoshone and its dialects.

Native Mammals and Birds. — Until driven into remote retreats, or exterminated, the animal life of Utah, while not abundant, was varied and comprehensive. Some of the more common mammals and birds were the mountain or hoary bat, the brown bat, now common in towns, and the shrew, the mole, the puma, the wild cat, the lynx, the coyote, the gray wolf, gray fox, red fox, kit or burrowing fox, and the badger that lives on ground squirrels, and robs the nests of bumblebees for the honey. The large, striped skunk, or Great Basin skunk, now living near

THE WONDERFUL CLIMATE

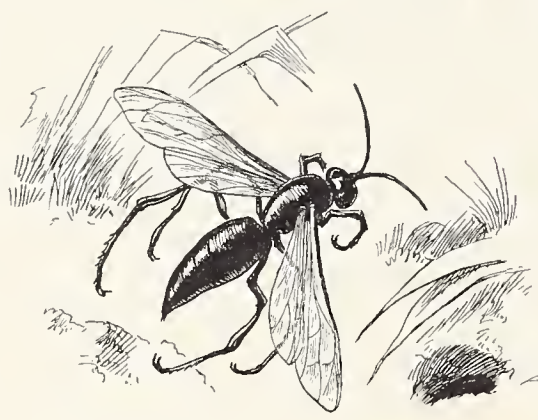
COUNTY	AVERAGE RAINFALL IN INCHES	AVERAGE TEMPERATURE	WARMEST EVER KNOWN	COLDEST EVER KNOWN
BOX ELDER	Winter, 3.1	26	59	−22
Average for the Year:	Spring, 3.8	46	87	−10
Temperature, 50° F.	Summer, 1.2	66	102	21
Rainfall, 10.6 inches.	Fall, 2.5	48	93	2
CACHE	Winter, 3.4	25	56	−19
Average for the Year:	Spring, 5.8	46	84	− 3
Temperature, 46° F.	Summer, 1.5	68	100	30
Rainfall, 14.03 inches.	Fall, 3.4	48	90	5
SALT LAKE	Winter, 4.1	31	68	−20
Average for the Year:	Spring, 6.2	50	93	0
Temperature, 51.4° F.	Summer, 2.1	73	102	33
Rainfall, 16.03 inches.	Fall, 3.7	52	93	− 2
UTAH [Provo]	Winter, 3.9	29	64	−18
Average for the Year:	Spring, 3.9	49	90	7
Temperature, 48.7° F.	Summer, 0.9	70	104	32
Rainfall, 11.9 inches.	Fall, 2.2	49	96	3
GRAND [Moab]	Winter, 2.0	32	69	− 9
Average for the Year:	Spring, 1.8	55	95	14
Temperature, 53° F.	Summer, 1.4	75	107	38
Rainfall, 7.5 inches.	Fall, 2.3	53	99	10
IRON [Parowan]	Winter, 2.0	28	65	−18
Average for the Year:	Spring, 1.4	45	85	8
Temperature, 48.6° F.	Summer, 1.9	69	98	31
Rainfall, 7.9 inches.	Fall, 1.8	56	92	3

COUNTY	AVERAGE RAINFALL IN INCHES	AVERAGE TEMPERATURE	WARMEST EVER KNOWN	COLDEST EVER KNOWN
GARFIELD [Hite]	Winter, 1.3	38	72	7
Average for the Year:	Spring, 1.8	60	98	18
Temperature, 45.8° F.	Summer, 1.2	83	115	44
Rainfall, 6.24 inches.	Fall, 2.0	60	102	20
WASHINGTON [St. George]	Winter, 2.8	38	77	− 1
Average for the Year:	Spring, 1.3	57	100	12
Temperature, 59.4° F.	Summer, 1.3	80	111	15
Rainfall, 6.79 inches.	Fall, 1.2	60	103	17
UINTA [Vernal]	Winter, 1.7	21	60	−25
Average for the Year:	Spring, 2.4	47	90	− 5
Temperature, 45.5° F.	Summer, 1.6	69	100	34
Rainfall, 8.4 inches.	Fall, 2.7	48	94	5
JUAB [Levan]	Winter, 4.6	26	58	−23
Average for the Year:	Spring, 5.3	46	88	2
Temperature, 46.8° F.	Summer, 1.9	69	101	30
Rainfall, 16.2 inches.	Fall, 3.4	48	90	8
MILLARD	Winter, 3.7	30	74	−17
Deseret, 48.5° F.	Spring, 5.1	49	97	4
Scipio, 46.8° F.	Summer, 2.0	72	112	32
Rainfall, 13.5 inches.	Fall, 2.7	53	102	9
WAYNE [Loa]	Winter, 1.3	23	60	−35
Loa, 42.6° F.	Spring, 1.4	40	82	− 5
Giles, 51.4° F.	Summer, 2.5	62	110	19
Rainfall, 6.6 inches.	Fall, 1.4	42	90	− 1

The annual average covering longer periods may not be the same as the average of the seasons.

cities, and beneficial because it destroys insects; the little spotted skunk, which does not care so much for civilized localities; the weasel; the once common mink, trapped for its fur; the wolverine, occasionally seen in the north; the grizzly bear, once quite common; and the black or American bear, which is sometimes brown in the West, all were of use to the red man.

The Indian boys would hunt the bushy-tailed gray squirrel, and the brown or red squirrel, also the very common chipmunk, the ground squirrel, the prairie dog, beaver, kangaroo mouse, meadow mouse, the common Rocky Mountain rat. They trapped the muskrat and caught the gopher. They reverenced the porcupine. The native hares were very useful to them. The jack rabbit furnished their food; the skins were made into blankets; also the similarly useful cotton-tail hare. Occasionally a warrior would kill an elk, or an American antelope, a Virginia or white-tailed deer, a mule or black-tailed deer, a bison or American buffalo. They watched the flight of the migratory sea gull, and the pelican. The blue-winged teal furnished delicious morsels, as did also the pintail teal, likewise the mallard, the Canada goose, still seen here: and the beautiful wild swan. The comical, shy bittern, the graceful blue heron, the long-legged crane, the curlew, and the snipe; the common or golden eagle, the American or bald eagle, the still common black turkey buzzard with a red head, were often seen. The Indians knew well the sparrow hawk, the chicken hawk, the red-tailed hawk, the common sharp-shinned hawk, the largest or great horned owl, the screechowl, the barn owl, the humming bird, the kingfisher, the common woodpecker, the Mexican woodpecker or flicker, the blue jay, the American crow, the western meadow lark, the field blackbird, the red-winged blackbird, the yellow-headed blackbird, the shore lark, the Oregon or common snowbird, the crimson-headed tanager, the bank swallow or martin, the common or black-headed chickadee, the mountain chickadee, the bluebird, the wonderful dipper bird, or water ouzel, the mourning dove, the tiny goldfinch, and (blue) bunting, the sage, song, and vesper sparrows, the grosbeak, kingbird, robin and others.



The Tarantula Killer, Pepsis Formosa.
Two thirds natural size.

Reptiles and Insects. — Reptiles include several lizards, the horned toad and the rattlesnake. Among the insects are the largest wasp known, the tarantula killer, and some of the largest spiders. Pepsis formosa, the wasp, stings and paralyzes the tarantula and then encases it in a cell for the larva of the wasp to feed upon. This spider group includes the wolf spiders, or true tarantulas, and the larger hairy kind, the lion spiders. Among the butterflies the large tiger swallowtails are the most conspicuous; the moths contain interesting groups, as do also the beetles. Many kinds of wonderful ants, the useful dragon flies, lady beetles, and lace-winged flies that prey upon vegetarian and household insects, are found. Grasshoppers and crickets have been the most troublesome pests. Wood ticks, centipedes, and scorpions are not uncommon.

Which of the carnivora occur in your county? Which are extinct? What other large animals occur? Any deer? Which of the burrowers? Describe their work. Do any of the larger birds of passage winter near you? What game birds occur? Why protect all the common birds except the English sparrow? Describe the fish caught in your district. Tell which of the following forms of animal life you have seen near your home; reptiles, butterflies, moths, grasshoppers, crickets, beetles, wild bees, wasps, ants, dragon flies, spiders, flies, mosquitoes, wood ticks. Which do you consider (*a*) beautiful, (*b*) beneficial, (*c*) harmful? Why should we never harm the toad? the dragon fly? the ichneumon fly? the lady beetle? the spiders? Why never kill the owl? the blue bird? the lace winged fly? the meadow lark? the mourning-dove? the robin? the lizard? the horned toad?

Native Vegetation. — The sagebrush, a bushy, silver-gray shrub, covers hill and plain everywhere, except in alkaline soil. Native saltbushes thrive on saline soils where every other form of vegetation perishes. These are low, mealy-leaved or sage-like plants that make good fodder when young, and that have the power of taking alkali from the soil. The government distributes seed of certain Australian varieties of these plants, which are especially useful for reclaiming the alkaline deserts. Native species include the shad scale, the winter fat, the Utah saltbush, and the great tumble-weed, all useful as fodders. The imported pest, the Russian thistle, is increasing ominously on the dry lands. Cedars at first covered many of the valleys and hillsides, and pines and balsams grew on the higher mountains. Systematic restocking with forest trees has only just begun. The canyons contain box elder, maple, birch, cottonwood, choke-cherry, elder berry, service berry, raspberry, dogwood, small mahogany, willow, sqawberry, sumach, and poison ivy; the plains, rabbit brush, cacti, torchweed, eriogonum, and mentzelia.

Flowering plants are numerous and beautiful. The earth is carpeted with flowers in spring, but, except in the mountains and near streams, becomes practically barren of them during summer.

Natural Vegetation. — What kinds of trees grow about your schoolhouse? What shade trees surround your home? What is your most common mountain tree? Which is the best native shade tree? the best native hardwood? firewood? the quickest grower? the slowest? What shrubs prevail in your valley? what grasses? saltbushes? weeds? burs? prickly plants? Collect seeds of every kind of useful plant growing near your school.

The Lion Spider, Eureyplema Hentzii.
One half natural size.

Colonization and Growth. — With the instinct of frontiersmen the pioneers located in the best places, — on sage brush plains, and in the valleys, at the foot of the towering Wasatch Mountains. It is now known, though they did not know it then, that thrifty sagebrush is a sure indication of high fertility, and that, if water can be secured, sage land has few equals. But the parched soil, the scorching July sun, and the sparse vegetation, warned them that water must be brought upon this dry land or it would yield nothing. With infinite toil they led the water from the canyons, for in the valleys each stream had cut a deep gulley. Across the benches they spread it upon the land in ditches, or flooded the baked areas so that they could be plowed, and immediately sowed their grain and vegetables. The growth was rapid and the crops were in a thriving condition when the crickets came and destroyed them. In consequence of this the people went hungry the first winter, but the spring brought sego bulbs and thistles which they found eatable.

Other immigrants arrived in long trains and soon spread into surrounding valleys. In a few years nearly every stream at the western base of the Wasatch range had its cluster of small log or adobe houses — the homes of the first settlers. Adobes, or sun-dried bricks, were made from clay and sticky soil that abounded in the valleys. Logs were secured from the canyons, many of which were wooded.

The Great Contest. — Few of the early settlers "prospected" for mines or went to California with the trains of gold-seekers. The counsel of the leading men was to remain in Utah and till the soil — a policy that has hastened the "winning of the west."

The establishment of Camp Floyd (Cedar Fort) and later of Fort Douglas by regiments of soldiery had two results: (1) the people looked upon the soldiers with a good deal of apprehension; (2) the military post required food for men and animals, and created a market for home products.

Sometimes the example of the gold-seekers was contagious, and the people recalled the advice of Bridger, the trapper, who had urged them not to settle in the desert, but go on to the fertile valleys of the Sierras. The first attempts to subdue the wilderness were not exactly victories, and seemed to justify Daniel Webster's characterization of it as "a vast worthless area, a region of savages and wild beasts, of deserts, of whirlwinds of dust, of cactus and prairie dogs, of endless mountain ranges, impenetrable, and covered to their very base with eternal snow." The first spring 8000 acres had been surveyed and each man had been allotted 10 acres. The second summer a remarkable incident occurred. Countless swarms of black crickets crawled from the mountains and were devouring everything, when enormous flocks of sea gulls appeared and devoured the insects. Gold-seekers' trains, stopping for needed rest and repairs in the valley, exchanged clothing and groceries for grain and vegetables. The skins of animals were utilized for clothing. Besides the sego, service berries, pine nuts, wild raspberries, currants and thistles were used as food. Actual famine was rare. The health of the adult population on scant rations was fairly good, but the death rate among young children was high. Irrigation began to produce such crops that "the valley" became the chief recuperating point and food center from which, by ox and mule caravans, much of the entire intermountain region was finally settled.

A Reminder. — Fifty years after Utah was settled, a pioneer procession marched, July 24, 1897, through Salt Lake City. Many of the very wagons in which the plains had been crossed were in line. Some of the pioneers again rode in them. A record of the survivors was obtained, and it is now kept in the governor's office. As each aged pioneer signed, he or she wrote some remark. A man wrote: "A very hard journey;" his wife, "I drove an ox-team half the way." Another, aged 74, wrote: "I helped to raise the U.S. flag on Encine (Ensign) peak." A woman of 70: "My mother died in consequence of the hardships." A man: "I had my thigh badly broken." A woman of 65: "The first dress I had after coming here was made from flour sacks." A man: "I have been in all the Indian wars . . . in Utah;" another: "I drove two yoke of cattle and one yoke of cows across the plains;" another: "I lived on sego lilies and thistle roots for six months;" another "lived on roots for a long time, had no shoes."

Isolation from the world markets, the hard toil necessary to live, and the lack of ready communication from one village community to another, made each locality self-supporting. Every man had to be farmer, lumberman, carpenter, builder, and Indian fighter. Each woman had much to do in weaving wool, spinning, knitting, mending, drying fruits, and making clothes. Children had daily occupations. Had any man in those days failed to work, some must have starved. No such need then, as now, for manual training in the schools. "Necessity, the mother of invention," drove the people to many odd expedients. Yellow rabbit brush blossoms furnished a dye for the woolen goods. Scraps of iron were very precious, and every nail or horseshoe was saved. Even the great Mormon tabernacle's roof timbers were put together with wooden nails. Ephedra leaves made "tea." Molasses was candy, sugar, and an all-round food. Milk, wild fruits, and vegetables made a good diet. Special trades began early, because everything had to be "home made." Each home was a little factory. Broken dishes were always mended. But soon woolen mills, tanneries, flour mills, and sawmills flourished. Frugality, industry, and perseverance won the battle. "The desert" began to yield to the persistent attack made upon it. Since each plant was individually cared for under desert irrigation, the yield became very large.

Irrigation and Water Power. — The making of water ditches was everywhere a leading industry. At first there seemed to be little water because the streams in many valleys disappeared in sink or desert or saline lake. But by making good channels the amount increased. When Davis county was settled, the score or so of families that for years comprised the entire population of each village were loath to welcome additions to their numbers, owing to the tiny size of the stream that supplied each settlement. To-day a thriving population in many prosperous towns, in which agriculture is still the prevailing pursuit, has water enough and to spare for new home-builders.

Irrigated Orchard, Davis County.

Canals were made, stream beds cleaned, springs developed, the waters held back by dams in mountain hollows (reservoirs). Perhaps, as the weather records tend to show, the verdure of the orchards and farms, replacing the desert shrubs, cooled the atmosphere and increased the rainfall. To make water ditches, canals, and reservoirs, all had to coöperate, and every family "lent a hand." Land without water was of no value. The community appropriated the water and owned it, allotting to each farm its share. Dividing the water was a delicate matter, and the city or ward water master was an important officer. As the population increased, stricter economy was used in apportioning the water; and where the water was entirely appropriated, a measurement or survey of the daily and weekly flow was made to determine the right of each farm to a certain portion. To-day an account of the measurement of streams, the seepage and other preventable waste of rivers, the building of dams and ditches, the duty, or amount of work in watering field crops that should be done by water, an investigation of reservoirs projected by the government or by individuals, and the list of applications since 1903 to appropriate water, are shown in a 661-page report of the state engineer for 1906. The following enterprises are represented: Irrigation, 654 applications; electric lighting and other power, 243; mining, 73; domestic and municipal, 44; stock watering, 94; miscellaneous, 35.

Local Work. — What canals in your valley? reservoirs? electric light plants? mining or manufacturing plants requiring water for power or other purposes? Has your town waterworks? Describe your water supply for drinking. Are there any large springs, rivers, or summer snow fields in the mountains near your home? What reservoirs are in operation? in contemplation? what facilities for them? How is the water measured, divided, and allotted? Is any of it wasted? How would you increase your water supply? How much land is still vacant for want of water? What is now the estimated population of your

town? of your county? Secure a school copy of Ex. Sta. Bulletin 124, a report on irrigation in Utah. It is the best Utah geographical reader.

How much land in your county is still open for appropriation? What proportion of it do you think worth taking up? for what purposes? Why is it not now occupied? What is the unbroken desert land worth per acre?

How does your district light its stores, streets, and houses? Are there any facilities for water power? Where have you seen any windmills? steam engines? water-wheels? flour mills? threshing machines? woolen mills? tanneries? sawmills? planing mills? stonecutting yards? brickyards? lime kilns? cement works? dye works? creameries? canneries? sugar factories? furniture works? Visit a manufacturing plant and describe the process of manufacture.

The force generated by the fall of the mountain streams has been made to do the work of mining, milling, the propulsion of cars, etc. Do you suppose that this cheap power may yet drive steam power into the background? Why? Why do we desire to lessen the consumption of coal?

Early Commerce and Travel. — Scattering travel to California and Oregon commenced in 1846, but it became an unparalleled movement in 1849. The Mormon battalion, enlisted for the Mexican war, came into California from the south, and was there mustered out. Some of the battalion men discovered the first gold in the sands of a California stream.

The Days of '49. — Soon the gold rush began. National hard times prevailed. Ministers, doctors, lawyers, merchants, and farmers, with their families, caught the new "yellow" fever, and betook themselves to a journey fifty times as long and hard as they had ever taken before. A party of five Frenchmen pushed a hand wagon from Missouri to the coast; one man trundled his possessions in a wheelbarrow. At its best, it was a journey that can scarcely be understood by the present generation; "at its worst, with Indian massacres, thirst, snows, 'tenderfootedness,' and disease, it was one of the ghastliest highways in history." In the height of this migration, from 4000 to 5000 immigrants died of Asiatic cholera, which, as Lummis says, "crawled in upon the plains, and like a gray wolf, followed the wagon trains; and if there was a half mile which the Indians failed to punctuate with a grave, the cholera took care to remedy the omission." In 1849, 42,000 people took this journey. Great freighting enterprises sprang up. By the sixties, 500 heavily laden wagons sometimes passed Fort Kearney in one day. One firm employed 75,000 oxen and 6250 big wagons, — mostly "prairie schooners," with huge boxes, 6 feet deep, often 17 feet long, carrying from 5000 to 16,000 pounds each, and drawn by from 6 to 12 yoke of oxen. The ox drivers were termed "bull whackers"; the mule drivers were called "Jehus"; they were guides, scouts, Indian fighters.

The Mail Coach. — The first eastern mail service was established between Salt Lake and Independence, Mo., cities 1200 miles apart. Stages made the trip once a month each way. The news of the creation of Utah Territory by Congress in September, 1850, reached Salt Lake City the following January; but it was sent by fast route *via* Panama to San Francisco, and thence to Utah by private messenger. The eastern mails for November, 1850, reached California in March, 1851. The overland stage to California began as a semi-weekly. To traverse this wilderness with its deadly deserts and dust storms, mirage, torture of thirst, and dangerous Indian tribes, required shrewd drivers of iron nerve. Then came the ever dashing pony express, which carried mail faster, farther, safer than it has ever been transported by horse power before or since. The time of these riders from Independence to San Francisco, 1950 miles, was ten days. The riders changed horses and mails at 190 stations, 10 or more miles apart, according as water chanced. "Buffalo Bill," the most famous of them, made a record of 384 miles, stopping only to change horses and swallow a hasty meal. Jack Keetley made a run of 340 miles in 31 hours. Overland messengers galloped six days and nights without taking off their clothes. As for the stage drivers, they were the best whips in history. One made 619 miles in 119 hours, without sleep. There were no roads. The famous Concord coaches pounded across the prairie sward, forded rivers, climbed mountains, and pitched down them again. In 1856, the government tried camels for the southwestern service, and imported Oriental drivers with them. But the camels could not stand the journey; several died of thirst, and the rest were finally turned loose in Arizona.

The First Railroad. — It was this vast traffic to which the cultivated fields of the Wasatch valleys gave needed succor, and from which, by exchange of products — mostly through barter, for there was almost no money — some of the necessaries of life were supplied to the hard-working agriculturists. Barter was universal among the settlers, also. Presently storehouses grew up, and the business of the merchant began. A man who had saved enough might go East and return with a schooner or a train of wagons bearing the products of civilization. But no one dreamed that the railroad was coming so soon. How could it cross mountains and deserts, hauling ties from 100 to 1000 miles, and change a journey that required five months into one of only three and one half days? Yet that was done. Twenty-five thousand men and 500 teams all working at once made the earth fly on the Utah grade, till early in 1869 the last spike was driven and the first Pacific railroad was completed. Before the year was out this was connected with Salt Lake City by the Utah Central Railroad.

The Utah Central, after reaching Salt Lake in 1869, was soon constructed southward to Milford and thence to the great Horn Silver mine at Frisco, 240 miles. These lines were built by the industry of the people of Utah, who also furnished much of the labor on the Union Pacific. Until 1882 the bulk of the railroad mileage which had been built was still operated as a sort of coöperative enterprise by the Mormon people. Later these lines were sold to the great railway companies which now operate them.

The Later Railroads.—The Denver & Rio Grande headed for Texas from the Colorado capital, having changed its course, came through the vast, barren plateaus of eastern Utah to Salt Lake City in 1883; and as lately as 1905, the San Pedro pushed on the conquests of the Oregon Short Line through southwestern Utah and the deserts of Nevada to Los Angeles.

The San Pedro, Los Angeles & Salt Lake was completed for traffic in May, 1905, and gave to Utah a new highway to the sea. Salt Lake and Los Angeles are now but a day apart, and Utah smelters receive the ore treasures of the new Nevada. The Western Pacific, another line being built from Salt Lake across the desert, will connect with San Francisco.

The hydrocarbon fields are reached by the Uinta Railroad from Mack, Col., northward 54 miles to Dragon. The train crosses the picturesque Book Cliffs, climbs a mountain on a grade of $7\frac{1}{2}$ per cent, and passes such places as Thimble Rock, Coyote Basin, and Dead Man's Bench — "a whirl of ragged ruggedness, natural amphitheaters, obelisks, temples, and pinnacles."

Local Work. — What products does your valley export? By team or rail? Where does the product finally go? What products are brought in? By what means? What stories of pioneer experiences have you heard (*a*) of crossing the plains by ox team, handcart, or mule team? (*b*) of the hardships of the early settlers? (*c*) of the Indian wars? (*d*) of the grasshopper war? (*e*) of the pony express? (*f*) of the mail coach? What pioneers are still alive in your valley? When was the valley settled? By whom? Effect of arrival of the railroad on (*a*) the food, (*b*) the clothing, (*c*) the furniture, (*d*) the "home industry" of the valley? Describe team freighting, hauling ties, excavating for railroad track, shipping of freight.

"There will be no Alps!" said Napoleon, when he was told that those mountains would prevent his army from passing into Italy. How does this famous remark apply to railroad engineering or to mountain road-making in your county? On what railroad is Saltair? Mercur? Park City? Heber? What railroad runs from Nephi to Manti? For what purpose? What new lines are now being built in your county? What railroad crosses Salt Lake? Why? In 1906 there were 1805 miles of railroad; the total valuation, not including side tracks, real estate, buildings, and rolling stock, was $16,650,334. What were the main lines worth per mile? Side lines reach 477 miles and were valued at $1,369,936. What was their value per mile?

Beaver has $640,715 worth of railway property within its borders; Box Elder, $4,360,868; Cache, $721,827; Carbon, $1,006,881; Davis, $856,550; Emery, $710,772; Grand, $914,686; Iron, $657,376; Juab, $1,118,627; Millard, $1,020,729; Morgan, $352,759; Piute, $44,752; Salt Lake, $3,039,499; Sanpete, $730,596; Sevier, $575,929; Summit, $1,048,224; Tooele, $998,790; Uinta, $15,900; Utah, $2,683,531; Wasatch, $141,839; Weber, $2,044,425. If the total state and county school tax of 37 mills for common schools and 25 mills for high schools should be voted for school purposes, how much school tax would the railroads in your county pay in a year?

Mining Copper Ore with Steam Shovels, Bingham District.

Mines and Mining. — In the westward migration of 1846–1860, were many men in search of fortune. Prospectors also came back from California. Their adventures have furnished materials for many true stories as romantic as tales of fiction.

They did not build homes, but lived in tents or cabins, procuring their supplies from the settlements and farms. But for the permanent homes made by the bulk of the people, mining would not have been possible. At first, the difficulty was in getting supplies to the mines or prospects. Pack mules were used, and a prospector's outfit was an interesting collection of food, clothing, pick, shovel and gold pan, and horn spoon. Water also was often hard to get, and privation and death were not uncommon.

Many of the pioneers had mined in California, and had brought gold that was made into those early $5, $10, and $30 pieces, that for years circulated in Utah. But when in 1863 General Conner came with a small army to settle Indian troubles, he encouraged his men to prospect while pursuing the Indians. They discovered the ore in Bingham, which became an active camp in 1868. In three years 100 mines or prospects were opened; silver, lead, and gold veins began to produce an output limited chiefly by the supply of water.

As early as the fifties, lead ore was discovered in Beaver county, and the people made bullets from it, not knowing that it contained high values in silver. In those days lead could not be shipped to Eastern markets. It had almost no commercial value on account of the cost of transporting it. Not till 1867, when Mining Commissioner Brown's report appeared, was the public generally informed that precious metals were to be found in Utah. Active work in mining at Ophir and Cottonwood began in 1870. Within 10 years mining was begun at Tintic, American Fork, Camp Floyd, Dry Canyon, Silver Reef, Frisco, Deep Creek, Park City, and Marysvale.

Smelting Plant, Garfield.

Gold Mining, Mercur. — To smelt ore is to render it fluid by heat. It is usually mixed with other kinds of rock, called the flux, to make it melt more readily. The heavy metallic parts sink to the bottom and are drawn off as bullion; the slag, or melted rock, floats on top. Some ores are roasted by heating in air, but not to the point of fusion, to drive off the sulphur. The smelters south of Salt Lake City have been subject to heavy claims for injury to agriculture, and much money has been spent to reduce the amount of sulphur in their smoke. The local market for sulphuric acid is small, the smelters are not within profitable reach of the Eastern markets, and they have found it cheaper to pay damage claims than to make sulphuric acid. The principal smelters are the Murray and Garfield plants of the American Smelting and Refining Co., the United States, the Highland Boy, and the Yampa.

In early days at Mercur by the usual amalgamation process of extraction, from 40 to 60 per cent of the gold was left in the tailings, or refuse ore. The ore was crushed and passed over copper plates covered with quicksilver, which collected the free gold as the pulverized ore was washed over the plates in water. This quicksilver amalgam was then heated in retorts, and the mercury was distilled off and collected for future use. The gold left behind was made into bricks. The cyanide process now used extracts from 70 to 95 per cent of the gold. As a result claims formerly abandoned may yet be alive with industry, the old ore dumps being worked over.

At the great cyanide mill of Mercur, which treats about 800 tons of ore and uses 600 pounds of cyanide each day, this deadly stuff is simply shoveled into tanks of water and dissolved. The ore, a soft, yellowish rock, is ground fine and soaked for 24 hours in the cyanide solution, which dissolves the gold. The next thing is to get the gold from the solution, which is done by passing the liquid through a series of compartments filled with zinc shavings, or into a tank containing zinc dust and stirred by a jet of air. The dissolved gold now deserts the solution and clings to the zinc. The water is drawn off, more cyanide is shoveled into it, and it is again ready for use. Weak sulphuric acid is added to the zinc dust and shavings and they are dissolved; the zinc solution is drawn off, leaving the gold behind in the fine slime. This mud is then filter-pressed, dried, ground, mixed with reagents, and melted. The gold sinks to the bottom and is finally run off into molds, forming real gold bricks worth from $20,000 to $30,000 apiece. Each average ton of this ore contains only $3.76 in gold, yet the daily output of this greatest of all cyanide mills is nearly $3000.

Silver Mining, Park City. — The greatest silver mining camp is Park City, 30 miles east of Salt Lake. It contains some of the largest silver mines in the world. A cubic yard of the glistening galena that lines the dark, deep tunnels may be worth $500. Ore valued at millions is in sight, but is far underground. To this buried treasure the miners descend by narrow openings or shafts through which the ore is raised to the upper air. Down the main shaft an elevator, controlled by large engines, "drops" or rises with amazing swiftness. The mines run 24 hours per day, Sundays and all. The men, working in eight hour "shifts," drill little holes into the breasts of ore, fill them with giant powder, and explode them when that particular tunnel is vacated. Cars drawn by horses that may never see daylight, carry the ore to the main shaft.

Copper Concentrating Mill, Garfield.

The ore is ground, then sifted, then either jigged in water or passed over shaking tables, till the heavier particles, or concentrates, are separated from the lighter or waste material. The mill is so arranged, usually on a hillside, that the water used in washing the crushed ore falls by gravity from each higher to a lower level. The refuse, or waste, is carried away; but the muddy water or slime is saved and run through filter presses, from which, in the form of thick cakes, it is finally dried and sent to the smelter.

Copper Mining, Bingham. — At first only those ores bearing silver from 8 to 60 ounces per ton, and lead from 30 to 60 per cent, with a value in gold of from $4 to $100 per ton, were mined. Ores of lower grade and all copper deposits were neglected. Improved methods of treatment and transportation have so changed the mining industry that the vast deposits of copper are now worked, and in 1906 Utah ranked fourth among the copper-producing states. Crude metallic or blister copper to the amount of 50,329,119 pounds was produced in that year mainly from three important districts, — Bingham, Tintic, and Frisco.

The Bingham district, in Salt Lake county, is sixth in importance in the country. It has had its gold, silver-lead, and copper periods of production.

The Tintic district near Eureka, Juab county, is the second copper camp. It is essentially a gold and silver mining region, and one of the richest in the state; but copper and lead are associated with the gold and silver. Nearly every producing mine has added more or less copper or lead to the output. The average yield of all the ores of this district is about 2 per cent of copper, but certain ores yield much more. Low grade ores in large deposits may be said to be the rule in Utah mines.

The Frisco district, Beaver county, has been famous for its horn silver, a rich ore that may be cut like horn. The bulk of the copper output for 1906, both in Bingham and Frisco, came from ores yielding a low percentage of copper; but low gold and silver values somewhat increase the profits from refining. The ore is concentrated and shipped to Salt Lake smelters.

Other Districts. — To the east of Frisco is Marysvale, containing mines of gold, silver, lead, copper, and quicksilver. When silver fell in value, this camp declined, but the gold values were later found to be very regular. Other copper regions are the Little Cottonwood district, the Park City mines, the Ophir district, and the Tutsagabet district, in Washington county. In all but the last named, copper is recovered incidentally to the production of other metals.

Gold Mountain in Piute county; Deep Creek, 140 miles west of Salt Lake City, a great camp, now chiefly gold and copper; and in the southeast the La Sal, the Blue and the Henry mountains, should be mentioned. In the far south is a copper-silver region around St. George, including the famed Silver Reef, a mining curiosity. In an immense reef or ledge of sandstone is found a petrified forest. Occasionally parts of stone trees and other rock containing fossils are taken and milled for their silver.

Coal Mine, Castle Gate.

Other Mineral Wealth. — Zinc ores often occur in connection with the ores and metals named above; a zinc plant is nearly completed in Park City. The ores of mercury, bismuth, antimony, and manganese are found, but not yet profitably worked.

Great deposits of rock salt occur in Juab, Sanpete, and Sevier counties. The Great Salt Lake holds within its waters a practically inexhaustible supply of salt. It is obtained by pumping the brine into elevated flumes, through which it is carried inland to prepared ponds. In the first or settling pond the water deposits its suspended minerals; thence it is run into crystallizing ponds, where it evaporates under the heat of the sun until the salt deposits in the crystal state.

Gypsum occurs as plaster stone, alabaster, satinspar, and in the crystallized state as selenite. The largest known selenite crystals, often a foot or more thick and several feet long, come from Wayne county. At Nephi a factory for the manufacture of plaster of Paris from massive gypsum has been in operation for many years.

Oil-bearing shales occur as extensive formations in several of the eastern and southern counties. Petroleum exists in the same region, and large oil fields are now being taken up.

Building stones of various kinds are quarried in many parts of the state, principally granite, sandstone, limestone, and marble. Clays of many varieties abound. The material is used for the manufacture of building brick, both common and pressed, vitrified brick for paving, fancy brick, sewer and drain tiles, sewer pipe and common kinds of pottery ware. The principal supply of fire clay is obtained from West Tintic Valley.

Mineral waters flow from natural springs in Weber, Salt Lake, Utah, Sevier, Millard, and other counties. Sulphur waters from springs near Salt Lake City, and lithia water from the vicinity of Deseret, Millard county, are bottled and sold.

Precious Metal Products. — The production of precious metals for 1905 is as follows: —

	Gold, oz.	Silver, oz.
Salt Lake	64,615	2,356,661
Juab and Utah	102,728	4,070,131
Tooele	44,821	
Summit (5,912,937 oz. silver, 1904)	14,699	3,958,628
Box Elder, Grand, and Washington	805	
Beaver, Millard, Piute, Sevier	21,287	245,834
Garfield, Morgan, San Juan, Uinta, Wasatch, Weber	180	
Box Elder, Grand, Washington, Tooele, etc. (539,332 oz. silver, 1904)		393,096
Lead produced in 1905	104,047,860 pounds.	
Copper produced in 1905	64,711,702 pounds.	

At $20.67 per ounce, what was the value of the gold (249,143 oz.) produced in Utah in 1905? In your county? With silver at $0.603 per ounce, compute the value of its total output in this state (11,025,208 oz.) in 1905. What was the value of the silver produced in your district? What was the value of the lead product at $3.11 per hundredweight? Of the copper at $0.1574 per pound? In 1887, the Utah production of gold and silver was $7,237,833; in 1905, it was $26,025,121. Account for the increase. What was the per cent of increase per year? Explain the enormous difference between the dividend (profits) and the value of the product. The value of the copper produced in 1898 was $426,691; in 1904, $6,379,140; and in 1905 nearly 50 per cent. more than in 1904. Account for the rapid increase.

Coal and the Hydrocarbons. — How is Utah supplied with fuel? Most of the wood that could be utilized for this purpose was consumed long ago. In 1907 the state burnt up 2,069,148 tons of coal. The mines in Utah produced 1,839,219 tons; so that some of the coal had to be brought into the state, although 67,318 tons were shipped beyond its borders. Besides this, 282,483 tons of coke were produced by partially burning the coal and driving off most of the gas and moisture it contains. At Sunnyside, in Carbon County, 3000 men and 750 coke ovens are operated. What is the price of coal per ton in your town? The average price at the mine is 1.18; at the yards, $5.50.

Origin of Coal. — Notice the layers recently reported from a mine of the Book Cliffs coal field in central and eastern Utah — a field extending from the eastern part of Sevier to near Castle Gate in Carbon county. First on top was a weathered coal crop; next came a layer of massive sandstone 50 feet thick; then a thin coal seam; then 10 feet of shaly sandstone; then a 1-foot layer, or vein, of coal; next a foot of shale followed by another thin layer of coal; then came another foot of shale, and then a layer of coal 5 feet 10 inches thick; after another thin shale parting there came a 6-foot layer of massive coal, followed by 1 foot of boney coal; then a great depth of shale and sandstone. What do these facts teach concerning the changes in this region in past ages? (§§ 68, 69, 70, and 71.) (Erosion, §§ 34, 35, 36.)

Sugar Beets under Irrigation, Lehi.

The Coal Deposits. — The coal deposits lie chiefly in Carbon, Summit, Grand, Sanpete, Iron, Emery, and Uinta counties. The region of greatest development extends from Summit to Iron county. About Coalville the veins, 8 or 10 feet thick, have fossils of one formation (Laramie) in the roof and of another formation (Fox Hill) in the floor. At Winter Quarters the seams are from 9 to 18 feet thick; at Scofield the vein is 28 feet thick; at Clear Creek the veins are 14 feet thick; and at Castle Gate the veins are from 5 to 10 feet. The Utah coal has about 46% of fixed carbon, 44% of volatile matter, and 10% of moisture and ash.

The Hydrocarbons. — Besides coal, this state is rich in other similar products called hydrocarbons — coal-like minerals that contain hydrogen as well as carbon. Of these, asphaltum is the best known, because it is used in street paving. Thirty-eight kinds of hydrocarbon are found in or near the Uinta basin. One of Utah's greatest resources is pure gilsonite, which is used in making varnishes, pipe dip, roofing materials, and to some extent in making rubber goods, which may consist of 40 per cent of gilsonite. The Utah variety is pure when mined, and requires no treatment after being taken from the vein. It is a bitumen that dissolves in benzine. Nowhere else in the world is it found in the pure form.

The total hydrocarbon area has been estimated at about 10,000 square miles, and the probable yield at 32,000,000 tons, exclusive of the elaterite veins, the bituminous limestone and the sand asphaltum deposits, west of Vernal. The value of gilsonite is $40 per ton and of elaterite $65 per ton. Elaterite is also spoken of as mineral rubber. Ozokerite, known as mineral wax, is found near Soldier Summit. Fifty-two by-products can be made from these hydrocarbons, including 13 different kinds of oil, varieties of water proof coating, etc.

Local Work. — What colors and kinds of sandstone rocks prevail in your county? Are there any conglomerates? How many kinds of limestone? Does your county yield slates? shales? marbles? onyx? gypsum? rock containing limestone shells? flint (quartz)? quartz crystals? granites? volcanic rocks? Describe the weight, luster, texture, color, of some of these rocks. Does your county produce salt? natural gas? coal? petroleum? graphite? gilsonite, asphaltum? clays for pottery? adobes? brick? Near your home are there any warm springs? sulphur springs? iron or mineral waters? petrified woods? limestone coating waters? Is your drinking water hard or soft? Clear or muddy?

Are there any gold mines in your county? silver mines? copper mines? lead mines? iron deposits? Collect ore from some mine. Ask miners as to zinc, antimony, bismuth, and mercury ores. Get specimens. Get information regarding magnetic iron ores (lodestone), blue copper ores (azurite), green copper ores (malachite), red and brown iron ores (hematite), and horn silver (sulphide) ores? Inquire about geodes, large numbers of which, from a few inches to several feet in diameter, occur at "the blow-out," a mountain of the Iron range.

The southern Utah deposits of iron contain an iron percentage of 61; it is magnetic or hematite ore and lies in a belt 15 to 20 miles long and 3 to 4 miles wide. The amount of available ore is estimated at four hundred million tons. The cost of making pig iron here should be less than at Pittsburg, $7.50 per ton. Mountains of this ore exist in Iron county.

What should this signify for Utah's future manufacturing? railroading? bridge-building? commerce?

Agriculture. — Practically twice as many of the people of Utah are engaged in agriculture as in any other occupation. Utah farms are usually of small size, but they yield great crops. Irrigation means high cultivation, and the yield corresponds with the almost doubled labor. The soil is highly charged with natural fertilizers, and is rich, deep, and vigorous. Irrigating water brings additional plant food to the soil it moistens. Almost the only fertilizer used is barnyard manure.

The valleys, where irrigated, are very populous. An early maxim was that a man should not own more land than he could cultivate, and holdings have been small from the first; 40 acres is called a large farm in Utah; Kansas farms average 160 acres each. Counting five to a family, a section in Kansas would have 20 inhabitants; in Utah 80; or, if in 5-acre farms, a Utah section would have 640 inhabitants.

Each small tract supports its family, and the benches common to every mountain side furnish excellent pasturage. The mountains form a background that becomes a grazing range for almost every farm; the rich bunch grass and deep canyons afford many good winter ranges for cattle and horses; the open deserts, for sheep.

"As the feed begins to give out on the lower benches in spring, the snow-line is receding on the foothills, and stock is pastured at higher altitudes as the season advances, until in midsummer they graze amid the grassy valleys and cool, high plateaus. When winter approaches, they gradually retire again, and by the time of the general snowfall are roaming over low, wide ranges where they cannot exist in summer because of the heat and lack of water. This changing life gives them health and hardihood." — CULMER.

Alfalfa, one of the most important forage plants of the world, grows to perfection on Utah soil. With plenty of water, the lower valleys secure from three to four crops per year; the higher, about two. One crop can be had on rough, dry, and stony ground without irrigation. The plant is adapted to dry farming, but does not thrive on cold and wet ground. Once well started, it needs no resowing. It has the peculiar power, like most other leguminous plants, of enriching the soil with nitrogen, the most valuable of fertilizers.

BEET SUGAR FACTORY, LEHI.

Wheat. — The yield of wheat ranges from 12 to 35 bushels per acre on dry land, to 60 bushels on small irrigated farms, and the grain is of excellent quality.

Oats. — Utah oats command a high price. The grain is heavy and well filled; 50 bushels per acre is not uncommon, and 85 bushels not rare.

Barley. — Utah barley is considered superior to any other produced in the United States. It is thin skinned, very heavy, and weighs over 50 pounds to the bushel. Southern counties produce an average of 52 bushels per acre.

The sugar beet has produced as high as 33 tons per acre. Prior to 1905, Utah's average production per acre was 12.71 tons; that of Germany, 10 to 11 tons; of Nebraska, 8 tons. About 35,000 acres are devoted to sugar beats. The product is 25,000 tons of sugar per year. Lehi, Ogden, Logan, Lewiston, and Garland have sugar factories. The plant at Lehi was the first in the inter-mountain region, installed while the beet sugar industry in America was yet in its infancy. From cutting stations at Provo and Spanish Fork, beet juice is conveyed by pipe lines to Lehi.

Sugar-making machinery was purchased in the fifties in Europe and hauled from the Mississippi to Salt Lake. Only partial success was attained with this plant. The modern factories are among the largest in the United States; they declare regular dividends and employ an army of labor. Whole communities cultivate the sugar beet; to its growth the soil seems peculiarly adapted.

Fruits. — Owing to the almost continuous action of the sunshine in the growing season, Utah fruits ripen superior in sweetness, firmness, beauty, and fine flavor. The peach thrives on light, gravelly or loamy soil. Many towns are buried in masses of pink peach blossoms in spring. Apricots, cherries, nectarines, apples, pears, plums, grapes, and all the small fruits thrive. In the extreme south, figs, pomegranates, cotton, and tropical products, with peaches, apples, melons, grapes, etc., extraordinary as to size, quality, and total yield, show how profitable will be the horticulture of those regions when railroads reach them.

At the exhibition of irrigated land products held in connection with the Fifteenth National Irrigation Congress at Sacramento, California, September 2–7, 1907, Utah's products won the *grand prize*, the Hearst Sweepstakes trophy, for the best collective state exhibit of irrigated land products, and the following special prizes for the best collective state exhibits: —

The Kiesel trophy for canned tomatoes; the Peltier trophy for canned vegetables; the *Los Angeles Times* trophy for grapes; the Shreve special fruit trophy for canned fruits; the Anheuser-Busch trophy for brewing barley; besides many individual prizes. Utah won eight out of the fourteen silver cups offered and competed for as state prizes, also cash prizes for the best collective exhibits of peaches, grapes, sugar beets, and the best timothy, and for the best single boxes of peaches, apples, and grapes. At Boise, Idaho, in September, 1906, Utah likewise took the sweepstakes and other prizes for the best collective exhibit of fresh fruits.

Arid Farming. — That it is possible, in the semi-arid regions, to mature good crops without irrigation was discovered as early as 1860. By the early eighties, the fact that certain lands could be made productive without irrigation was generally accepted, and 12 years later the practice was successful in northern and central Utah. Dry farming has now become an industry of great promise. In Utah alone there must be from 10 to 20 million acres that may thus be reclaimed. Practical proof of the methods that make dry farming profitable in each new section is like the discovery of large areas of virgin soil before unknown, yet located at our very doors. It is also known that the use of too much water washes away nitrates and potash from the soil, leaving it poor, while the water carrying these various minerals then flows down to the lower lands, making them alkaline, and unfit for good farming. Less water, greater service, and no injury to lower lands are now the farmer's aim.

CITY AND COUNTY BUILDING, SALT LAKE CITY.

The Two Problems. — For successful arid farming, two problems are to be solved: First, to catch all the rain of winter; second, to keep it from evaporating during the summer. The first object is attained by deep plowing in the fall. In this way about 85 per cent of the winter moisture may be retained till spring. Then the land should be harrowed, so as to form a thick, fine mulch of pulverized soil at the surface. To prevent evaporation the harrowing should be repeated not long after every rainfall. No weeds should be permitted to grow, since they consume the soil moisture.

Soil is composed of rock grains of all sizes. It must be made less like a solid substance and more like a sponge — filled with spaces between the grains, so that it has plenty of capillary tubes in which moisture can be held.

Soil moisture is lost in two ways: (1) the free water percolates or sinks downward until it is lost to the roots of the plants, or (2) the water is lifted by capillary attraction to the surface of the soil, and escapes into the air by evaporation. In the arid West, little of the soil water is lost by sinking.

Dry Farming requires from 8 to 12 inches of annual rainfall; but in some places as little as five inches has been sufficient to produce a paying crop.

If it is possible to store two thirds of the rainfall in the soil, and if each inch of rain stored will produce 2½ bushels of wheat per acre, will it pay to "dry farm" in your county when it costs $5 per acre to plow, seed, and harvest? Would it pay at a cost of $6 per acre? at a cost of $8?

For dry farming, soil should be from 4 to 6 feet deep and not given to baking and cracking on the top from the presence of too much clay. Sand on top is advantageous. Is your soil suitable?

STATISTICS OF INDUSTRY, 1906

Sheep	2,375,116	Pigs	204,512
Lambs	1,304,730	Shoats	34,501
Wool, lbs.	15,215,242	Turkeys	35,315
Av. wt. fleece, lbs.	6.74	Geese	5,501
Horses and Mules	74,188	Ducks	11,866
Cows	72,012	Chickens	973,342
Cattle	155,605	Stands of bees	21,391
Yearlings	66,605	Honey, lbs.	1,362,014

	Number of Stores	Capital in Stores	Amount Business
General Merchandise	686	$8,087,513	$31,068,513
Groceries and Meats	526	1,939,830	10,157,481
Other Stores	1,104	15,110,023	48,130,771
Wines, etc.	327	1,382,632	5,730,853
Total	2,643	$26,519,998	$95,087,618

	Number of Employees	Capital	Product
Canneries	1,081	$ 866,703	$ 386,206
Clay Products	524	1,289,322	1,337,553
Creameries	284	527,460	1,296,901
Flour Mills	226	1,266,913	1,647,966
Metal manufacturing	342	337,489	985,017
Woolens		823,612	640,909

The biennial report of the state board of horticulture shows the status of the industry and may be obtained by writing to the secretary.

In 1905 there were planted 192,968 acres of wheat, of which 99,169 acres were irrigated, yielding an average of 28.2 bushels, and 93,799 acres not irrigated, yielding an average of 15.3 bushels per acre; oats, 50,250 acres, av. 39.3 bu.; barley, 12,359 acres, av. 36.1 bu.; rye, 6,431 acres, av. 12.3 bu.; corn, 6613 acres, av. 25.3 bu.; potatoes, 11,462 acres, av. 140.7 bu.; sugar beets, 23,654 acres, av. 9.15 tons; sorghum, 314 acres, av. 35.3 gallons; lucerne, 293,544 acres, av. 2.59 tons; tame hay, 24,906 acres, av. 2.02 tons; wild hay, 65,226 acres, av. 1.65 tons; to which may be added other crops amounting to 22,987 acres, the gross product value of which is reported as $1,215,816.

ACREAGE OF LANDS APPROPRIATED AND RESERVED BY COUNTIES IN 1906

Counties	Population 1900	Reserved	Appropriated	Total Surface Area	County Seat
Beaver	3,613	148,680	70,958	1,649,000	Beaver
Box Elder	10,009	347,132	712,493	3,488,000	Brigham
Cache	18,139	91,930	357,965	766,000	Logan
Carbon	5,004	960	167,028	975,000	Price
Davis	7,996	. . .	135,674	180,000	Farmington
Emery	4,657	233,490	159,177	2,790,440	Castle Dale
Garfield	3,400	475,400	56,101	3,248,000	Panguitch
Grand	1,149	191,280	45,062	2,401,000	Moab
Iron	3,546	267,170	227,516	2,104,000	Parowan
Juab	10,082	37,340	174,040	2,122,000	Nephi
Kane	1,811	219,389	53,396	2,716,000	Kanab
Millard	5,678	294,520	223,130	4,265,000	Fillmore
Morgan	2,045	7,204	231,551	386,000	Morgan
Piute	1,954	208,240	53,528	484,000	Junction
Rich	1,946	72,823	213,001	678,000	Randolph
Salt Lake	77,725	68,600	357,403	496,000	Salt Lake City
San Juan	1,023	640,974	23,990	5,078,000	Monticello
Sanpete	16,313	317,524	338,527	1,003,000	Manti
Sevier	8,451	316,470	147,955	1,217,000	Richfield
Summit	9,439	601,963	457,458	1,264,000	Coalville
Tooele	7,361	185,452	218,410	4,431,000	Tooele
Uinta	6,458	1,535,765	271,529	3,329,000	Vernal
Utah	32,456	362,222	358,147	1,340,597	Provo
Wasatch	4,736	1,492,148	335,429	2,841,248	Heber
Washington	4,612	516,210	68,146	1,562,000	St. George
Wayne	1,907	33,920	50,328	1,525,000	Loa
Weber	25,239	68,240	166,666	350,000	Ogden
Totals	276,749	8,735,046	5,674,608	52,689,285	

Population of Utah, Jan. 1, 1908, estimated at 350,000. By the census of 1900 it was 276,749, of whom all were white except 672 Negroes, 572 Chinese, 417 Japanese, 1151 taxed, and 1472 untaxed, Indians. The estimate by counties, 1908, gave Beaver 4350, Box Elder, 11,000; Cache, 21,500; Carbon, 6200; Emery, 5100; Garfield, 4150; Juab, 11,285; Salt Lake, 140,000; Sanpete, 17,500;; Sevier, 9200; Summit, 10,600; Uinta, 7500; Utah, 37,900; Wasatch, 5001; Washington, 5070; Weber, 43,000; and other counties about as in 1900.

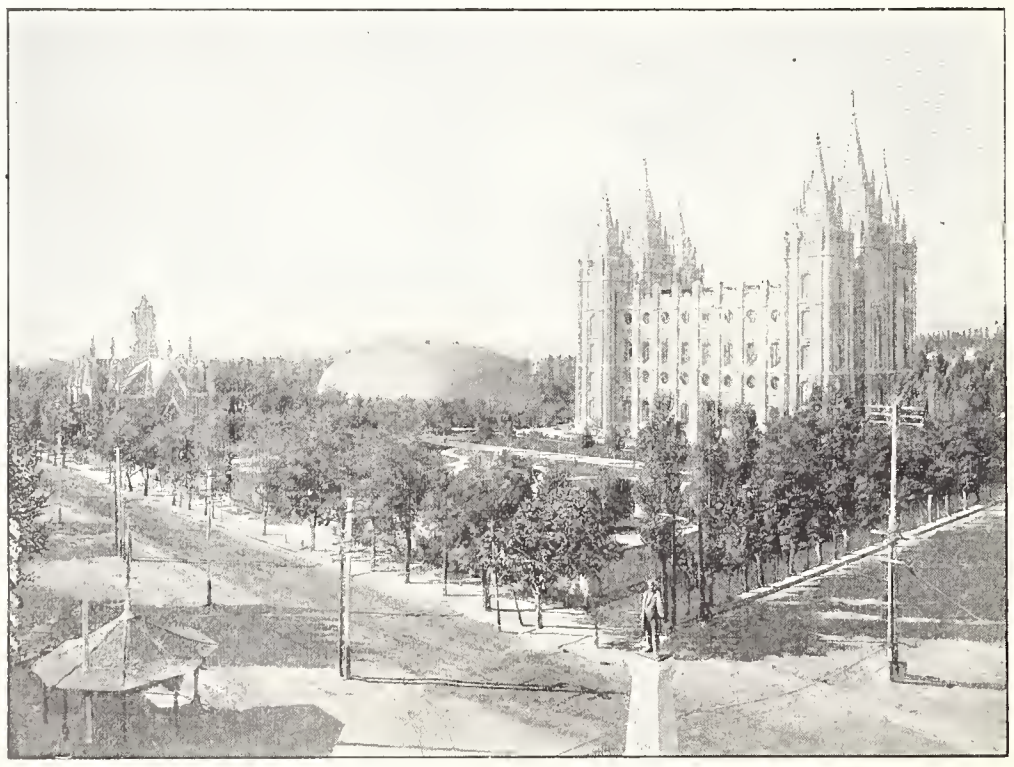
FEDERAL BUILDING, SALT LAKE CITY.

Local Work. — Which is your leading grain (cereal)? What other grains does your district produce? Describe the plowing, seeding, cultivation, harvesting, and marketing of any one. Tell about your leading hay, forage, or fodder, its growth, care, price, farm value. Mention your minor hay or forage plants, wild or cultivated, and describe one or two leading root crops, garden vegetables, and your best fruits. Give price per pound, bushel, or ton, and compute the value of each crop. Does any disease affect any of your fruits? When do you spray? What sprays are best? When and how do you prune? Why? When do you plant? Do you sow any fall wheat? What kinds? Do you raise strawberries? What are the best kinds? What pome fruits flourish in your county? What stone fruits? small fruits? gourd fruits? In 1906 the average size of Utah farms had risen to 80 acres, because arid land can be farmed only every other year. Counting 6 to a family, estimate the population of five sections.

Cities and Towns. — *Salt Lake City*, the capital and largest city, in an angle of the Wasatch range, 12 miles from the lake, is noted for its wide streets, abundant shade, extensive lawns, and attractive residences. Mountain streams insure a plentiful supply of water and provide electric current for power and light. By means, also, of miniature canals, water is conducted through all the streets for the irrigation of trees and gardens.

This city is the educational, business, and social center of the entire state and large portions of the surrounding states. It has railroad communication with every part of the country, and many important manufactures.

The buildings of chief prominence are the joint City and County Building, the Mormon Temple and Tabernacle, the various public school buildings, and the leading hotels and churches. The suburbs include warm and hot springs and Salt Lake for bathing, many canyon resorts, Fort Douglas, and several fine parks.



Temple Square, Salt Lake City.

Ogden, built on one of the Bonneville deltas, is an important railroad center, and has a large trade. Electric power furnishes exceptional facilities for manufacturing. The school buildings of Ogden are superior and the educational standards are high. The state school for the deaf and the state reform school are located here. A plant in the picturesque canyon supplies Ogden and other places with electric power.

Provo, beautifully situated near Utah Lake, yet close to the Wasatch range, has excellent water power and manufactures woolen goods. The state mental hospital is located here. Good public schools and the Brigham Young University afford unusual advantages for education. *Lehi*, *American Fork*, *Pleasant Grove*, *Springville*, *Spanish Fork*, and *Payson* are centers of a rich farming and fruit section.

Logan, in the verdant and productive Cache valley, with an unlimited supply of water for both irrigation and power, has the State Agricultural College, the Brigham Young College, and a good system of public schools. *Richmond*, *Smithfield*, *Hyrum*, and *Wellsville* are grain, stock, or dairy centers.

Park City, high up on the Wasatch range, is noted for the public spirit and enterprise of its people, and for its rich silver mines.

Ashley, in Uinta county, is a trading town for the military post at Fort Duchesne and the Uinta and Uncompahgre Indian reservations. There are extensive cattle and sheep interests in the vicinity. *Beaver* is one of the more important towns of southern Utah, containing the Beaver Branch of the Brigham Young University. *Bingham Canyon*, in Salt Lake county, is one of the largest mining camps. It ranks first in the state in the mining of lead and copper. *Brigham*, near the northern shores of the Great Salt Lake, is the center and shipping station of the richest fruit region in the state. *Cedar City*, at the base of the range that forms the southern rim of the Basin, contains the State Branch Normal School. *Heber* is a thriving town in the upper Provo valley. Near it is *Midway* with remarkable warm springs, forming "hot pots," very deep, and large enough for bathing pools. *Manti*, with its temple, *Ephraim*, with the Snow Academy, and *Mount Pleasant*, with large business interests, are important places in Sanpete valley. Farming, grazing, and dairying interests center here. *Richfield*, a rapidly growing town, is the commercial center of the Sevier valley, which has canals for irrigating 30,000 acres of arid land. *Monroe* has hot springs. *Salina* has a mountain of gypsum, pure salt in large masses, alum, and saltpetre. *Marysvale*, the terminus, 1908, of the Sevier valley branch of the Rio Grande railroad, is a shipping point for Piute, Garfield, and Kane counties. *Mercur* is a new but rapidly growing town in the western gold-mining district. *Nephi* exports large quantities of wool, plaster of Paris, salt, and flour. *Eureka* has many rich mines. *Payson* is a thriving agricultural and stock-raising center. *Price* is the shipping point for a large section of country. From a reservoir in Sanpete county the Price river and a canal bring water upon a tract of 40,000 acres. *St. George* is the business center of the valley of the Virgin River, which exports the fruits of warm countries. *Fillmore*, the early capital, is surrounded by a dry region which now has ample reservoirs for reclaiming the arid land.

Local Work. — Account for the location of your town; describe its water system; name its industries. How many and of what breeds does any live-stock producer in your vicinity raise or sell in a year? What commodities are sold in your stores? Where do some of the imported goods come from?

What do you regard as the most remarkable geographical feature in this state? What most impresses you about its past? What do you expect will be its future? What would you like to do in order to aid its development?

Elevations. — Logan, 4507 feet; Millville, 4508; Meadowville, 6200; Woodruff, 6500; Corinne, 4232; Snowville, 4360; Huntsville, 5100; Ogden, 4307; Morgan, 5068; Farmington, 4231; Salt Lake City, 4366; Uinta, 4496; Heber, 5559; Park City, 6970; Theodore (Wasatch Co.), 5507; Tooele, 4900; Ibapah, 7500; Black Rock (Millard), 4855; Deseret, 4541; Fillmore, 5700; Castle Dale, 5500; Green River, 4080; Levan, 5010; Manti, 5548; Mt. Pleasant, 6300; Payson, 4622; Provo, 4512; Soldier Summit, 7477; Thistle, 5050; Wellington, 5540; Aneth (San Juan), 4800; La Sal, 7000; Escalante, 5258; Tropic, 7000; Hite, 3000; Kanab, 4925; Loa, 7000; Marysvale, 5839; Frisco, 7318; Minersville, 5070; Moab, 4000; Modena, 5479; Parowan, 5970; Pinto, 4620; St. George, 2880.

If the climate averages one degree cooler for every 300 feet of elevation, how much cooler is Pinto than St. George? Loa than Moab? etc.

VIEW OF PART OF OGDEN.

What valleys occur in your county? Ascertain their size, elevation, soil, climate, chief product, and natural wonders, if any, and arrange thus: —

NAME	SIZE IN MILES	ELEVATION	SOIL	CLIMATE	PRODUCT
		Feet			
Cache	10 × 30	5000	Fertile	Cool	Grain
Box Elder	. . .	4300	E. Fertile	Warm	Fruit
Salt Lake	10 × 18	4300	E. Fertile	Warm	Fruit
Utah	N. × 40	4500	Fertile	Warm	Fruit
Juab	. . .	5500	Sandy, Clay	Medium	Grain
Bear River	. . .	5000	Fertile	Cold	Hay
Weber	N. × 60	6000	Various	Cold	Hay
Parley's Park	10 × 10	7000	Various	Cold	Hay
Thistle Valley	3 × 10	6000	Various	Cold	Hay
Sanpete Valley	15 × 50	6000	Fertile	Medium	Grain
Sevier Valley	5 × 125	5–8000	Fertile	Dry	Grain

N.—Narrow and irregular. The valleys east of the Wasatch are not easily tabulated. Make a map of your valley. Tell of its resources.

Government. — The state constitution was adopted in 1895, and on January 4, 1896, President Cleveland signed the proclamation which made Utah the 45th state in the Union. Notable features of the state government are equal suffrage for men and women, a board of pardons, the limitation of taxation and public indebtedness, and the fixing of eight hours as a working day.

The legislature consists of a senate and a house of representatives, and its sessions are held biennially. Senators are elected for four years, and representatives for two years.

The executive department includes a governor, secretary of state, state auditor, state treasurer, attorney-general, and superintendent of public instruction, each of whom is elected for four years.

The judicial power of the state is vested in the senate sitting as a court of impeachment, in a supreme court, in district courts, and in such other courts inferior to the supreme court as may be established by law.

Utah has two senators and one representative in congress, and three votes in the electoral college.

Education. — The public free school system is one of the best in the Union; the school property valued at $2,476,036 in the state outside of cities of the first class and $4,395,096 in Salt Lake, Ogden, Provo, Logan, and Murray, which are districts under local control. In the state, 84, and in the cities, 81, per cent of the school population attend school. Of 95,769 children of school age (6 to 18), 85,666 read and write.

When Utah was admitted to statehood it acquired by act of congress extensive grants of public lands for edu-

THE SCHOOL OF MINES AND LIBRARY BUILDING OF THE UNIVERSITY OF UTAH, SALT LAKE CITY.

cational purposes. Besides sections 2, 16, 32, and 36 in each township, which are to be used for the benefit of the common schools, many hundred thousand acres are set apart for the support of higher education and for technical and normal schools. Ultimately these lands will yield a large revenue.

Free Public Library, Salt Lake City.

The educational system is controlled by the state board of education, the state superintendent of public instruction, the county superintendents of public schools, and boards of education in the various districts. Cities of the first and second classes have independent school districts, each with a board of education and a superintendent of schools.

The highest institution of the public school system, the University of Utah at Salt Lake City, was founded in 1850. It comprises the State Normal School, the State School of Mines, and the School of Arts and Sciences, besides both Law and Medical departments. A branch normal school is conducted at Cedar City. The Agricultural College at Logan provides instruction and practical training in agriculture, the mechanic arts, and domestic science. A school for the deaf, dumb, and blind is conducted by the state at Ogden. The Industrial School is located at the same place.

There are several private and denominational institutions. Among these are the Latter-day Saints' University, Sheldon-Jackson or Westminster College, All-Hallows College, Rowland Hall, and St. Mary's Academy, all of Salt Lake City; Brigham Young University, Provo, with a branch at Beaver; Weber Academy and Sacred Heart Academy, Ogden; and the Brigham Young College, Logan.

Aids to Teachers of Geography

Gannett, Garrison, and Houston's Commercial Geography	$1.25
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